MEASURING, COMPARING, AND CONTRASTING THE AGRICULTURAL PARADIGMATIC PREFERENCES HELD BY FLORIDA EXTENSION AGENTS: THE REDEVELOPMENT OF AN INSTRUMENT TO DETERMINE INDIVIDUAL AND COLLECTIVE PREFERENCES

A Record of Study

by

LAURA ANNE SANAGORSKI

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Approved by:

Co-Chairs of Committee,	Theresa Pesl Murphrey
	David E. Lawver
Committee Members,	Matt Baker
	James Lindner
Head of Department,	Jack Elliott

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ABSTRACT

Significant support for sustainable agriculture practices exists within the land-grant university system nationwide. Despite this fact, many colleges, including the University of Florida, have not evaluated the individual paradigms held by their faculty. An existing Alternative-Conventional Agriculture Paradigm Scale was modified, improved and converted into an electronic instrument that was administered to a random sample of University of Florida Extension Faculty. It is suggested that data collected through this study serves the following purposes: assist the University of Florida's decision-makers in better understanding the positions held by their Extension agents; allow improvement of educational programming for Extension agents, agricultural professionals, and communities throughout the state; and provide input for improvement of University-wide policy-making and goal-setting.

The study consisted of three phases: a) redevelopment and pilot-test of a new ACAP instrument; b) description of University of Florida Extension faculty's paradigmatic preferences; and c) determination of any existing relationships between personal characteristics and an individual's paradigm. A pilot study of the new instrument was conducted with participants belonging to known paradigmatic groups who were not part of the final sample. The survey was found to be reliable with a Cronbach's alpha coefficient of 0.94 in a pilot test of 26 individuals. The survey was found to discriminate effectively between the two known paradigmatic groups ($t=4.091$, $p= .001$), making it a useful tool in quantitatively assessing agricultural preferences.

Following the pilot study, survey research was conducted with a random sample of 188 Extension agents. The majority of faculty aligned with agricultural paradigmatic groups labeled Moderates and Sustainables. Very few of this population aligned with a Conventional paradigm.

Exploratory factor analysis resulted in a preliminary seven-factor solution. Two individual component factors were found to vary based on Extension discipline and gender, which included Size and Scale of Production and Use of Natural Resources, respectively.

DEDICATION

Each of us chooses an agricultural paradigm every time we eat. This document is dedicated to Extension professionals around the world who have devoted their lives to improving the quality of life in their communities and through their work to enhance our opportunity to choose.

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INTRODUCTION

Background and Setting

Consumers and producers alike are demanding that more sustainable agricultural systems be adopted (Sustainable Agriculture Education Association (SAEA), n.d.). Educational and other organizations continue to adopt sustainability in their sets of goals and objectives (Jacobson, Niewolny, Schroeder-Moreno, Van Hom, Harmon, Fanslow, Williams, & Parr, 2012; SAEA, n.d.; USDA, 1999a) as sustainability is becoming more intertwined with agricultural policy (USDA, 1999b). Agricultural educational programs have been established and are evolving as the complexities and values associated with sustainable agriculture are addressed (Galt, Clark, & Parr, 2012).

Advocates for a more sustainable, or alternative, agricultural system have reported that it represents a critical solution to current agricultural practices, which they say are economically, environmentally, and socially devastating (USDA, 1999b). For the purpose of this research, sustainable agriculture was defined as "an agriculture that can evolve indefinitely toward greater human utility, greater efficiency of resource use, and a balance with the environment that is favorable both to humans and to most other species" (Harwood, 1990, p. 4). The definitions for conventional agriculture are quite broad, and may include: the production of uniform, high-yield crops; extensive use of fertilizers, pesticides, and energy inputs; high labor efficiency; large-scale systems; and large capital investments (USDA, 1999b).

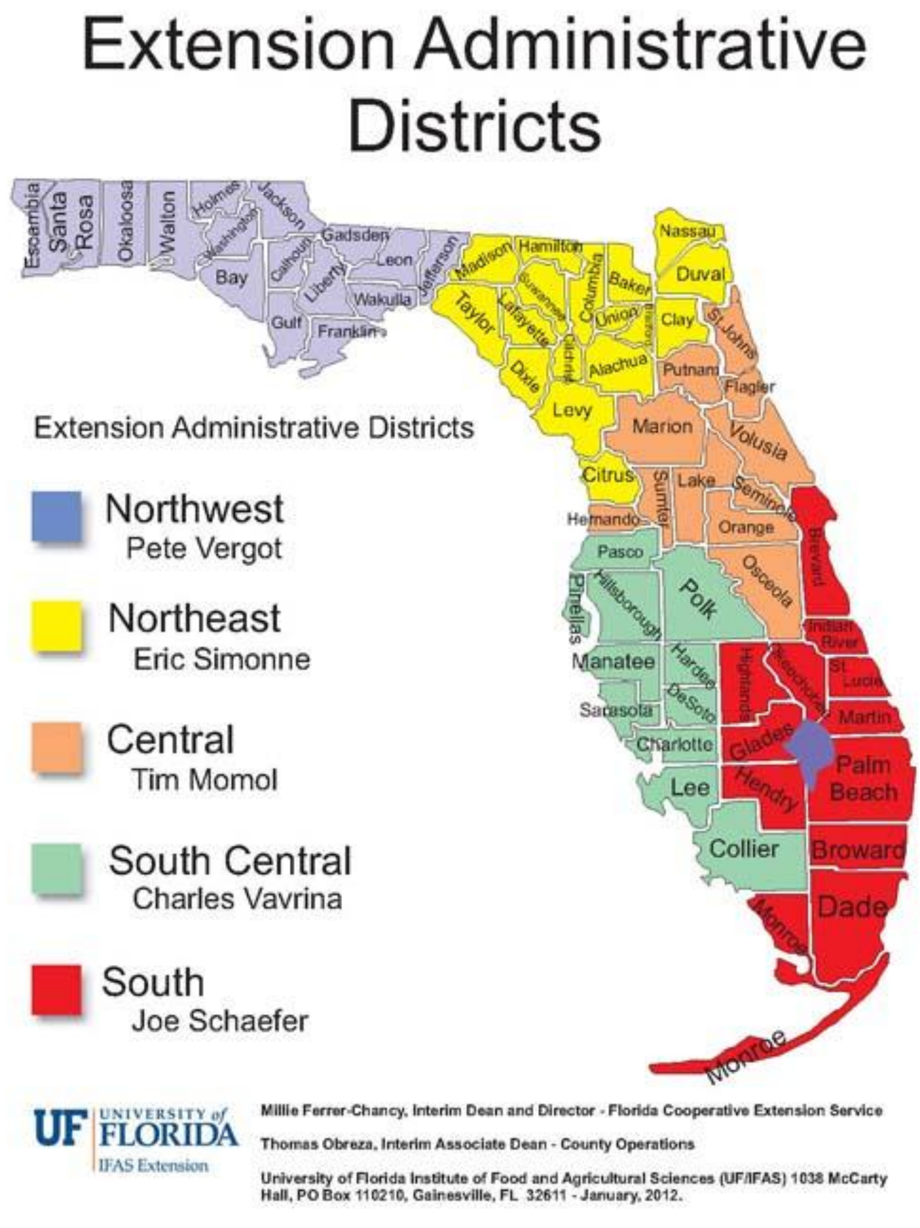
Some proponents of the conventional paradigm have reported that the environmental claims made by the sustainable school of thought are exaggerated or simply untrue (Avery, 2005; UCS, 2007). Advocates for conventional agricultural systems claim that this paradigm is more effective at producing high yields than sustainable agricultural methods (UCS, 2007). This is an important claim to consider, given the growing world population and billions of people to be fed by our global agricultural systems.

The World population increased to over seven billion in 2011 (United Nations, 2011) and is projected to rise to over nine billion by 2050 (Food and Agricultural Organization of the United Nations (FAO), 2009). Simply, the agricultural systems chosen now, and in the near future, must not only continue to be successful, but become even more productive in a very short time. The choice of an agricultural paradigm is critical not only to the environment, but to the world population as well.

The Cooperative Extension Service, a segment of the land-grant university system, plays a major role in teaching communities, producers, and consumers about agriculture. Land-grant universities were established by the Morrill Acts of 1862 and 1890 to make higher education available to all people, at a time when higher education was available only to those who were extremely wealthy (Sanderson, 1988). The Cooperative Extension Service offers community education throughout the United States. This program was developed to deliver research-based information to individuals, with the intention of improving some aspect of their lives (USDA NIFA, 2011). Land-grant universities in each state provide this service, with educational programming generally revolving around horticulture, agriculture, home management, youth, food, and family. Extension faculty, or Extension agents, are sometimes referred to as field faculty, and serve people at the local level throughout the United States, solving local problems and delivering high-quality, research-based information.

This network of Extension agents are faculty who teach at the community level throughout each state. These individuals can operate as the cornerstone of the shift towards making room for a more sustainable agriculture, serving as instructors and the providers of critical educational resources. In Florida, the Cooperative Extension service is administered by the University of Florida and Florida A&M University. The Cooperative Extension service is housed in the University of Florida's Institute of Food and Agricultural Sciences (IFAS). At the state level, the Florida Cooperative Extension Service is divided into five Extension Administrative Districts, which are presented in Figure 1. Locally, there are sixty-seven counties in the state of Florida, each of which is served by a county Extension office (UF / IFAS Extension, 2008).

Figure 1
Map of Florida Extension Administration Districts. From "Florida Extension Administrative Districts". Copyright 2007 by the Office of District Extension Directors. Reprinted with permission.



Extension agents support and educate consumers, producers, and communities regarding choices about agricultural consumption and production. Agents' personal values, beliefs, and preferences affect what they teach. It is important to recognize Extension agents' perspectives towards agriculture in order to understand an Extension system's informal stance towards this topic. The identification of Extension faculty members' preferred paradigm can allow for prediction for an individuals' likelihood to teach toward one particular agricultural model. This research suggests that the identified trends in Extension agents' perceptions can be used as a starting point from which to develop educational programming and can serve as a framework from which to begin discussions about policy and statewide Extension education goals. Further, an understanding of Extension agents' agricultural paradigms provides opportunities to focus in-service training on areas of greatest importance.

As a means of measuring these paradigms, the Alternative-Conventional Agriculture Paradigm (ACAP) Scale developed by Beus and Dunlap (1991) was updated and converted into an electronic instrument and administered to Florida Extension Faculty. Data collected through this study aims to: a) assist the University of Florida's decision-makers in better understanding the agricultural preferences held by their Extension agents; b) allow improvement of educational programming for Extension agents, agricultural professionals, and communities throughout the state; and c) provide input for improvement of University-wide policy-making and goal-setting.

Statement of the Problem

Sustainable and Conventional Agriculture

Sustainable agriculture has been deemed a promising response to the trend toward "global integration, economic consolidation, and environmental degradation" (Feenstra, 2002, p. 99). This agricultural paradigm includes the facets of economic, environmental, and social balance, and the preservation of natural resources (Feenstra, 1997; Hanson & Hendrickson, 2009; Ikert, 1998; Rodriguez, Molnar, Fazio, Sydnor, & Lowe, 2005; UCS, 2007; USDA, 1999b). Specifically, sustainable agricultural practices must be profitable to the producer and beneficial to the community, while preserving and protecting wildlife, water, soil, and other natural resources. The social component of sustainable agriculture suggests that this paradigm supports local jobs, fair trade, and good working conditions (Rodriguez, Molnar, Fazio, Sydnor, & Lowe, 2005; UCS, 2007; USDA, 1999b). The reference to economic balance in most definitions of sustainable agriculture indicates the importance of upholding profitability in an agricultural system while protecting and maintaining environmental and social well-being (Rodriguez et al., 2009; UCS, 2007; USDA, 1999b). Sustainable agriculture often incorporates scientifically-based practices such as mechanical weeding, composting, integrated pest management, crop rotation, permaculture, precision agriculture, and soil nutrient testing (Alonge & Martin, 1995; Chavez-Tafur &Vermeulen, 2010; Feenstra, 2002; Gomiero, Pimentel, & Paoletti, 2011; UCS, 2007).

Sustainable agriculture is not embraced by everyone. Advocates for a conventional agricultural paradigm feel that this method produces higher crop yields

(UCS, 2007). Given the rising world population and billions of people to be fed by our agricultural systems, this assertion should not be overlooked. Skeptics of sustainable agriculture have stated that environmental claims made by the sustainable school of thought are exaggerated or simply untrue. In an argument for conventional agriculture, Avery (2005) suggested that alternative and conventional agriculture were equally as likely to cause soil erosion. Sustainable agriculture is often associated with more crop diversity than conventional agriculture (USDA, 1999b). In one study, however, Avery found that species diversity and richness in semi-natural areas located on farms was not different, regardless of an agricultural operation's tendency towards conventional or sustainable agriculture (2005).

Lack of Definition/Separation

Lack of a singular universal definition for sustainable agriculture and the general ambiguity of the term are frequent criticisms in this field (Hanson & Hendrickson, 2009; Jayaratne, Martin, & DeWitt, 2001), and may even be "inhibiting cooperative progress toward long-term minimization of the off-site environmental effects and negative social/economic impacts of some of today's agricultural practices" (Keeney, 1990, p. 281). "Sustainable agriculture is a complex, site-specific, not well understood system" (Hanson, Kauffman, & Schauer, 1995, p. 155) and it "is a complex and contested concept, and so precise definitions are impossible" (Pretty, 1995, p. 1247). According to Ikert, "we may never have a generally accepted definition of sustainability, and perhaps, we don't need one" (Ikert, 1998, para. 2). According to the USDA (2007), a "lack of sharp definition has not lessened its authenticity" (p. 14).

While it is acknowledged that a definition of sustainable agriculture may be fluid and site-specific, for the purpose of this research, the definition of sustainable agriculture was identified as “an agriculture that can evolve indefinitely toward greater human utility, greater efficiency of resource use, and a balance with the environment that is favorable both to humans and to most other species” (Harwood, 1990, p. 4). A clear difference between sustainable, alternative, and organic agriculture has not been identified; for the purpose of this study, the terms were considered transposable (Agunga & Igodan, 2007).

It is important to note that sustainable and conventional agriculture are often presented as opposing viewpoints as argued by some, but they should not be considered exclusive of one another. This was confirmed by Goldberger and Buttel (2001), who evaluated researchers’ agricultural paradigms, finding that those committed to conventional practices did not denounce sustainable agricultural paradigms.

The very “concept of conventional agriculture was developed in order to clarify and justify alternative approaches to agriculture” (Hansen, 1996, p. 120). As such a complex issue, the definition of sustainable agriculture may vary based on the specific location and the viewpoint taken when looking at the system (Gomiero et al., 2011). For example, wild plants may play a large role as both a food source for and attractant of beneficial insects in one rural sustainable system, while another system, perhaps an urban one, may not have this luxury (Gomiero et al., 2011). The urban system’s sustainable agriculture may rely heavily on cultivated beneficial insect attractants and purchased pollinator insects. Given the strong support that exists for both extremes of the agricultural spectrum, and all points in between, it is suggested that room should be made for sustainable agriculture in traditionally conventional systems.

Accommodating Alternative Agriculture

It has been recognized that the community affects a grower's ability and motivation to adopt sustainable practices (Fazio, Rodriguez Baide, & Milnar, 2005). Extension agents are an important component in the future of sustainable agriculture, serving as change agents and educators in their communities. Numerous barriers that alternative farmers face (e.g., the acquisition of specific practical skills and access to information) have been identified as ideal opportunities for Extension educators to become more involved (Agunga & Igodan, 2007; Alonge & Martin, 1995; Hanson, Kauffman, & Schauer, 1995). Rodrigues, et al., 2009) identified Extension efforts as potential strategies for overcoming barriers to the adoption of sustainable agriculture; Extension has been identified as a critical component to its success (Allahyari, Chizari, & Mirdamad, 2009). While Alonge and Martin argued that Extension agents could be critical change agents for sustainable agriculture (1995), and Agunga reported that they play a major role in growers' decision-making regarding their relationship with and impact on the environment (1995), their studies did not consider Extension faculty from the state of Florida.

Significant support and demand for alternative agriculture exists at the organizational, national, and international levels. Organizations that are demanding sustainability include: a) schools and universities (Ferguson, Lamb, & Swisher, 2006; Jacobson et al., 2012); b) private industry; c) governmental agencies, through outreach programs such as the Sustainable Agriculture Research and Education program (SARE, 2010); and d) nonprofit organizations, such as the Florida Certified Organic Growers and Consumers (FOG, 2012). Gonzalez identified an “emerging consensus among policy-makers at the international level that promoting sustainable agriculture is necessary to address the environmental and food security challenges of the 21st century” (2011, p. 516). The 1990 Farm Bill acknowledged that Extension agents should be educated in sustainable agricultural practices in order to effectively teach their audiences (Agunga, 1995). The most recent Farm Bill (H. Res. 2419, 2008) included incentives for converting land to support sustainable grazing or crop production methods and made funding a priority for those who seek loans to convert land into organic and alternative production systems (2008), indicating the longevity and significance of this agricultural paradigm. Further support for this agricultural paradigm was indicated by the emergence of numerous community-university partnerships that exist for the purpose of catalyzing more sustainable agriculture through education (Niewlolny, Grossman, Byker, Helms, Clark, Cotton, & Jacobson, 2012).

The 2007-2010 National Research Agenda for Agricultural Education and Communication identified the question of “[h]ow can agricultural Extension education contribute to the sustainability of local and global communities…?” as a major priority in research (Osborne, n.d., p. 6). Sustainability continues to be an important component of agricultural education. The 2011-2015 National Research Agenda for Agricultural Education and Communication recognizes that “a sufficient supply of well-prepared agricultural scientists and professionals is needed to drive sustainable growth” and address 21st century challenges (Doerfert, 2011, p. 9). One such challenge is in supporting the selection of conventional or alternative production methods by producers and consumers alike. Extension agents have the potential to serve as the responders to this challenge. In fact, the education of Extension faculty has been identified as the primary and most important task in diffusing sustainable agricultural practices (Jayaratne, & Martin, 2001). The 2011-2015 National Research Agenda also asserts that "(a)n informed citizenry, including policy decisions at all levels, will create win-win solutions that ensure the long-term sustainability of agriculture, natural resources, and quality of life in communities around the world" (Doerfert, 2011, p. 8). Further, it is stated that one area of particular concentration should be "(i)ncreasing our understanding of … the extent of change in audience knowledge, attitudes, perceptions and behaviors … after consuming related information and messages" (Doerfert, 2011, p. 8). This supports the claim that an understanding of Extension agents' perceptions towards agriculture is critical to good programming efforts, and emphasizes the need to look at paradigms in all states, including Florida.

Agricultural Paradigms and the Influence on Teaching and Learning

A true paradigmatic shift has been identified in concert with the adoption of sustainable agriculture. The appearance of alternative agriculture reflects not only changes in production practices, but also represents a shift in paradigmatic preferences, environmental beliefs, attitudes, and values, as noted by Abaidoo and Dickinson (2002). Galt, et al. (2012) found that our evolving food system indicated a need for changing paradigms in addition to behaviors. A paradigm can be described as "an example that serves as a pattern" and "the conceptual framework that permits the explanation and investigation of phenomena" (Paradigm, 1997, p. 989). For the purpose of this research, an individual's agricultural paradigm was defined as their preferred model of agricultural practices. This research suggested that an individual's paradigm falls on a continuous scale at some point between a greatly conventional preference and a greatly alternative or sustainable preference.

Relationships between production preferences and specific attitudes have been identified (Allen & Bernhardt, 1995; Beus & Dunlap, 1994); therefore, it is useful to look at Extension agents' attitudes towards any topic they may be expected to teach. Subject matter does not exist in a vacuum but is deeply connected to those who teach and learn it. It is important to develop "teaching methods that make values and attitudes visible in agricultural education and consider human values as both subjects and agents in relation to … agriculture" (Botelho, 1999, p. 208).

The relationship between agents' agricultural preferences and their teaching and learning experiences can be further explained by Mitzel's Model, as described by Dunkin and Biddle (1974). Mitzel's Model described teaching and learning as being influenced by several variables. The outcomes of a teaching and learning experience, or Product Variables, are influenced by Context, Process, and Presage Variables. The Mitzel Model described Context Variables as student characteristics and environmental factors, while Process Variables are described as the specific activities that occur during the act of teaching and learning. Presage Variables are characteristics of educators that can influence the teaching process. Presage Variables include educators' attitudes and life experiences (Parr, Edwards, & Leising, 2006), and would thus include their orientation to agriculture, directly linking their agricultural paradigms to their teaching activities and outcomes. Table 1 provides characteristics of each variable.

Table 1
Characteristics of Variables in Mitzel's Model that Impact Product Variables

Variable	**Characteristic**
Context	Student-specific characteristics Environmental factors
Process	Specific activities that occur during teaching and learning
Presage	Educators' attitudes Teacher life experiences

Note. From *The study of teaching*, by M.J. Dunkin and B.J. Biddle, 1974, New York: Holt, Rinehart and Winston.

Many individuals have insisted that Extension and other organizations must work to better understand their personnel. Emphasizing the magnitude of understanding the feelings and paradigms of individuals in an organization, Eveland stated that "one cannot pay people enough, long enough, to get them to do things or use tools that do not have intrinsic worth and value to them" (1986, n.p.). Agunga (1995) asserted that the important point of study is "not whether there is or isn't information on sustainable agriculture but rather how Extension agents feel about the issue and why" (p.184). Knowledge of Extension agents' feelings towards sustainable agriculture continues to increase in importance as land-grant universities "struggle with issues such as changing clientele, agribusiness industry relations, and agricultural sustainability" (Beus & Dunlap, 1992, p. 365). Agunga (1995) found that Extension agents needed significant training in this area.

A solid understanding of how Florida Extension agents feel about agriculture is an ideal starting point for assessing this group's overall stance and developing educational initiatives to better prepare agents to teach within the sustainable/conventional agricultural continuum, since those who feel positively towards sustainable agriculture will accept and promote the system (D'Silva, Samah, Uli, & Mohamed Shaffril, 2011). Knowledge of paradigmatic views is an important prerequisite for developing policy and educational responses to concerns about food production and the environment (Abaidoo & Dickinson, 2002). Simply, if Extension agents do not value sustainable agriculture, they will not adopt it or encourage others to do so.

Designing Valuable Educational Experiences for Extension Agents

In-service training is an effective method of providing Extension agents with opportunities to increase knowledge in specific subject areas, obtain research updates, and increase professional competencies (Mincemoyer & Kelsey, 1999; Smith, K.L., 1985). Developing sustainable agricultural in-service training programs based on the audience's known needs, values, and perceptions is a key to successful education (Menalled, Grimberg, & Jones, 2009). An identified "fundamental tension – between what we have been prepared to do and what we must do" (Galt et al., 2012, p. 4) justifies the importance of addressing values in sustainable agricultural education. Francis and Carter (2001) examined over 1,000 evaluations from sustainable agriculture workshops in the midwestern United States and illustrated the importance of developing inclusive sustainable agriculture programs based on an audience's expectations.

Land-grant universities have been accused of historically subscribing to a conventional paradigm (Berry, 1977, as cited in Beus & Dunlap, 1992). Beus and Dunlap explored this claim by administering the ACAP scale to faculty at Washington State University. They discovered that faculty at that land-grant university were in fact quite conventional in their paradigms (Beus & Dunlap, 1992). It has been suggested that land-grant universities should include education on sustainable agriculture as part of their Extension curriculum (Agunga, 1995). Hanson, Kauffman, and Schauer (1995) asserted that mandated training on this topic is imminent. Without satisfactory training on sustainable agriculture, Extension agents are not likely to conduct programming on the topic (Agunga, 1995).

Alternative Agricultural Farmers' Need for Extension

As agriculture changes and the Cooperative Extension Service continues to take on a larger role in sustainable agriculture (Hanson et al., 1995), "agricultural professionals … must now actively create a whole new professionalism" and "Extension agents should be adapted themselves with these changes" (Allahyari, 2009, p. 784). Agunga and Igodan (2007) explored sustainable agriculture producers' perceptions towards Extension, and found that the producers greatly needed Extension.

However, producers were found to use Extension educators as only secondary information sources, due to the fact that they viewed Extension as lacking in knowledge about sustainable agriculture (Agunga & Igodan, 2007). This paradox points to a substantial opportunity for Extension to become more involved and provides validation for the significance of this study. As noted by Jayaratne et al. (2001), the discovery of this group's perceptions may be an indication of whether they are prepared to carry out this task. Minarovic and Mueller (2000) asserted that Extension professionals' views of agriculture and their feelings towards the concept of sustainability are critical in developing programs in alternative agriculture.

The Alternative-Conventional Paradigm Scale

This research builds on Beus and Dunlap's (1991) Alternative-Conventional Agricultural Paradigm (ACAP) scale, which was developed to measure individuals' paradigmatic views towards agriculture, and found to significantly discriminate between the two perspectives. The instrument contains twenty-four "bi-polar items that portray the respective positions of the two paradigms as anchor points on a multi-point scale" (Beus & Dunlap, 1991, p. 438). One-half of these items were randomly reversed in direction to reduce response set bias. The instrument was validated against individuals known to belong to each of the polar positions. Content validity was ensured to the extent possible by including "items covering the full spectrum of the agricultural debate" which included factors in the six major dimensions illustrated in Table 2 (Beus & Dunlap, 1991).

Elements of the two paradigms were classified into six pairs of concepts: centralization versus decentralization; dependence versus independence; competition versus community; domination of nature versus harmony with nature; specialization versus diversity; and exploitation versus restraint (Beus & Dunlap, 1990, 1991, 1992), as presented in Table 2. The first of each of the proceeding pairs reflect an element of a conventional paradigm; the latter reflect an alternative one. These constructs are accurate descriptions of elements associated with each paradigm's definition (USDA, 1999b). However, it should be noted that these constructs were not statistically validated using confirmatory factor analysis.

Table 2
Beus And Dunlap's (1991) Paired Elements Representing Agricultural Paradigms

Conventional Paradigm	**Alternative Paradigm**	**Scale Items**
Centralization	Decentralization	E, I, M, O, U
Dependence	Independence	C, G, R
Competition	Community	A, D, H, J, K, W
Domination of Nature	Harmony with Nature	F, L, N, S
Specialization	Diversity	P, T
Exploitation	Restraint	B, Q, V, X

Note. From "Measuring adherence to alternative vs. conventional agricultural paradigms: a proposed scale" by C.E. Beus, and R.E. Dunlap, R.E., 1991, *Rural Sociology 56*, p. 432–460.

Beus and Dunlap confirmed that the statistically significant differences between mean item scores and other score statistics provided “the strongest test of known-group validity” (1991, p. 448), supporting the claim that the ACAP instrument significantly discriminates between the two paradigms, which is further evidence of its validity. Although this instrument was found to be useful, reliable, and valid, it was found to contain errors that this study sought to address. Namely, there were several double-barreled statements as well as some language that was determined to be outdated. Further, the scale appeared to be written for individuals within a traditional, rural agricultural system, and would possibly exclude respondents living in more urban agricultural areas, such as those in many locations in Florida.

Reliability on the original ACAP scale was measured by the researchers at .88 using Cronbach’s alpha coefficient (Beus & Dunlap, 1991). Cronbach’s alpha is an excellent measure of reliability when using scales for research (Santos, 1999) and when measuring tests that are not “scored right versus wrong” (Fraenkel & Wallen, 2008, p. 158). On a scale from 0.00-1.00, with 1.00 being the maximum level of reliability, the coefficient of .88 can be considered quite reliable. In general, a reliability coefficient greater than 0.70 would be acceptable for use (Fraenkel & Wallen, 2008). Other researchers evaluated Beus and Dunlap’s ACAP Scale. It should be noted that the instrument was found to be “appropriate and useful in studies of the agricultural intelligentsia (agricultural scientists, farm policymakers, organizational leaders…)” (Jackson-Smith & Buttel, 2003, p. 513). Beus and Dunlap found that the score on their ACAP instrument correlated strongly with agricultural behaviors (1994). Others, including Rasmussen and Kaltoft, have agreed that this instrument "is a suitable method for quantitative assessment of attitudes to agriculture in a broader context" (2003, p. 2). While these findings strongly support this instrument's use in measuring Extension agents' perceptions, it had not been administered to faculty at the University Florida Extension system.

Measuring Paradigms

Previous research on Extension agents' perspectives and agricultural paradigms was conducted by Agunga (1995), Beus and Dunlap (1991, 1992, 1994), Minarovic and Mueller (2000), and Jayaratne et al. (2001). Beus and Dunlap determined that their ACAP scale discriminated clearly between the known alternative and conventional agriculturist groups (1991). The authors found that Washington State University faculty with non-farm backgrounds and non-land-grant educations, especially those who were younger and female, were more likely to be oriented to the alternative agricultural paradigm (1992). Further, Beus and Dunlap (1992) found that Washington State faculty members differed significantly from those aligned with the alternative agricultural paradigm and that "faculty are somewhat more conventional in their overall perspectives than are statewide farmers, particularly on issues dealing with the welfare and vitality or rural residents and rural communities – an area of research specifically recommended by the Hatch Act" (p. 376). It was not known how these findings would relate to University of Florida Extension faculty.

Jayaratne et al. (2001) determined that agricultural and natural resource educators in the north-central United States "had a positive perception regarding … sustainable agricultural practices" (n.p.) and that there was a significant "need for well designed educational programs for diffusing sustainable agricultural practices and technologies" (n.p.). Minarovic and Mueller (2000) found a similar "positive response regarding the attitudes of [North Carolina Cooperative Extension Service] professionals towards sustainable agriculture" (n.p.). Jayaratne et al. found that the positive perceptions they identified were not correlated with educational attainment, age, or gender (2001, n.p.). Agunga (1995) found that Ohio Extension agents did not feel that they had the information needed to provide Extension programming on sustainable agriculture. However, he posited that the information is available, but that the real issue of concern is "rather how Extension agents feel about the issue and why" (1995, p. 184).

Theoretical Framework

This research is supported by literature that describes organizational behavior as a function of the individual. According to Eveland (1986):

> When we speak of 'organization's behavior' we sometimes lose sight of the fact that such behavior … is a composite average of the behavior of lots of individuals each acting out of their own context and responding to their own imperatives and interests. Ultimately, technology transfer is a function of what individuals think -- because what they do depends on those thoughts, feelings, and interests. (n.p.)

Outwardly, the University of Florida exhibits a strong pro-sustainability stance. It offers an organic and sustainable agriculture curriculum to students; its Extension faculty has taught growers about organic production methods for over 20 years

(Ferguson et al., 2006). The University of Florida has indicated that sustainable use of environmental resources in agricultural, natural resources and food systems was a priority for educational programming as part of its Statewide Goal and Focus Areas (2008). The University was named as one of the top six schools in the United States to facilitate learning and research about organic agriculture (OFRF, 2012). These are just some of the many visible signs that indicated the University's commitment to facilitating sustainable agriculture in Florida.

While entities such as the University of Florida appeared to be strongly committed to furthering sustainable agriculture, it cannot be assumed that employees of an organization "are committed to a unified vision" (Minarovic & Mueller, 2000). Rasmussen and Kaltoft (2003) explored agricultural perceptions in educational organizations and asserted that it is often wrongly assumed that teachers and students share the same visions as the larger institute. Eveland (1986) also recognized the importance that individual actions play on collective behavior and the critical dependence society's adoption of ideas has on individual feelings and actions. Gomiero et al. (2011) suggested that society might need to change its paradigms to best protect our soil and environmental health and future generations. The literature suggested an overwhelming demand for agriculture to embrace sustainability (Jayaratne et al., 2001), and for Extension systems to be deeply involved. The question still remains: How do Florida Extension agents feel about agriculture?

This research was further guided under the theoretical framework of diffusion of innovations. Rogers (2003) described a number of characteristics of innovations (Table

3) that affect their rate of adoption; one of these is relative advantage, or “the degree to which an innovation is perceived as being better than the idea it supersedes” (p. 229). Rogers (2003) presented a theory that “(t)he relative advantage of an innovation, as perceived by members of a social system is positively related to its rate of adoption” (p. 233). Eveland (1986) asserted that within an organization, adoption of an innovation was ultimately a function of individual preferences. It was hypothesized that relative advantage would not be perceived by individual producers and consumers if change agents, such as Florida Extension faculty, do not believe the innovation to be beneficial.

Table 3
Rogers’ 5 Factors (2003): Characteristics of Innovations That Influence Adoption

Factor	**Description**
Relative Advantage	If individuals feel that the improvement of the current innovation is better that the existing one, they are likely to adopt it.
Compatibility	The level of compatibility that an innovation has to be incorporated into an individual’s life.
Simplicity	If the innovation is perceived as easy to use, an individual is likely to adopt it.
Trialability	If a user is able to experiment with an innovation, the individual will be more likely to adopt it.
Observability	The more visible an innovation is, the more likely a user is to know about, dis njmkcuss it, and adopt it.

Note. From *Diffusion of innovations,* 5th edition, by E. Rogers, 2003, New York, NY: Free Press.

This research sought to determine individual Extension agents' perspectives as a true measure of an organization's stance in order to predict their likelihood of adoption and better understand the educational needs of this audience.

Significance of the Study

The significance of this study is three-fold. First, it provides the first documentation of baseline data regarding the University of Florida Extension faculty's agricultural paradigmatic preferences. Second, it explains that Florida Extension faculty are more sustainable oriented than previously may have been anticipated, meaning they are likely to teach towards this paradigm, given the appropriate training and tools. Third, this study labels three agricultural paradigmatic groups: Conventionals, Moderates, and Sustainables, the second of which may be a new paradigm.

Purpose

The purpose of this research was to a) pilot test an updated ACAP scale instrument; b) describe and evaluate Florida Extension agents' orientation toward alternative or conventional agriculture; and c) determine if relationships existed between individual characteristics (i.e., land-grant education, gender, geographic location, teaching discipline, and age) and agricultural paradigm. Specifically, it was anticipated that this research would add to the base of knowledge on attitudes held by Extension agents towards sustainable and conventional agriculture and allow for documentation of Florida Extension Agents' agricultural paradigms, suggest potential approaches towards educating both Extension agents and their audiences, and ultimately contribute to further development in this field of study.

Objectives

The study included objectives that sought to:

1. Develop a reliable and valid instrument that could effectively quantitatively measure agricultural paradigms.
2. Describe agricultural paradigms held by University of Florida Extension faculty.
3. Determine if relationships existed between University of Florida Extension faculty's individual characteristics and their agricultural paradigms.

Methodology

The target population of this study was all 305 University of Florida Extension agents in all disciplines. The methodology was survey research of a simple random sample of University of Florida Extension agents. The desired sample size for a population of 300 is 169 (Krejcie & Morgan, 1970). Based on this recommendation, a sample size of 188 was selected by the researcher. Respondents in the random sample were asked to complete an electronic survey.

The instrument used was an updated electronic version of the existing ACAP scale (Appendix E). Dr. Curtis Beus granted the author permission to further develop the ACAP instrument (C. Beus, personal communication, July 25, 2011). Beus and Dunlap's (1991) ACAP scale was modified to clarify and update individual statements and was converted into an electronic instrument through Qualtrics (Qualtrics Labs Inc., Provo, UT). The original statements in the ACAP scale instrument were rewritten to reflect modern language and to reduce errors. For example, the original instrument referred strictly to farmers and farmland, two terms that may not connect with modern producers. Many current agriculturalists may relate better to terms such as growers or producers, and therefore these terms were used in the new instrument. Items were added to collect descriptive data of the sample, including gender, age, department, education attained, land-grant versus non-land-grant education, and farm versus non-farm backgrounds.

This instrument used paired Likert-type scale items that corresponded with opposing viewpoints on agriculture. Each respondent was asked to select a position between the two statements on a five-point scale. The central position indicated that the individual was unsure, or neutral. Scale positions closest to either statement indicated very strong agreement with the item, and secondary positions closest to either statement indicated moderate agreement towards that statement.

Half of the items remained reversed, as with the original instrument (Beus & Dunlap, 1991) in order to reduce response set bias (Weijtersa, Geuensa, & Schillewaerta, 2009). The modified ACAP scale was reviewed and further edited by a panel of subject and research experts in order to verify the validity of items and clarity of statements. The expert panel included faculty from two land-grant universities. Panel members were chosen for holding the following qualifications and positions: 1) Specialization in Extension education; 2) Proficiency and substantial research in program development and evaluation; 3) Contribution to the field of research evaluation methodology and reducing error in surveys; and 4) A professor of sustainable agricultural systems.

Experts' comments and recommendations were incorporated into the final version of the instrument. The resulting modern ACAP scale (Appendix B) was used for this research.

Prior to utilizing the updated ACAP scale, a pilot study was conducted in order to calculate reliability of the instrument. The new instrument was piloted with groups known to belong to each end of the agricultural paradigmatic spectrum. Based on the recommendations of Johanson and Brooks, 24 - 30 responses with 12 - 15 originating from each known group were sought (2010). A total of 26 responses, including 12 originating from individuals with known strong conventional perspectives and 14 originating from individuals with known strong alternative perspectives, were collected.

Following the pilot study, data were collected from the random sample of University of Florida Extension agents. Data collection was modeled on the recommendations of Dillman, Smyth, and Christian (2009) and included three contacts, which were distributed electronically: a combination introductory letter and questionnaire mailing and two replacement surveys for non-respondents. The survey remained open for a total of 36 days.

Once data collection was complete, the reversed items were transposed, so that all conventional responses would fall on one side of the scale, with all sustainable responses falling on the opposite side. The data were coded so that each response corresponded with a numerical value between one and five. The most conventional response was indicated by a "one", "three" indicated a neutral response, and "five" indicated the most alternative response. This coding allowed statistical comparisons between individual items, and also for an overall "Sustainability Score" variable to be calculated. An individual's Sustainability Score could potentially range from 24, which would indicate a strongly conventional agricultural paradigm, to 120, which would indicate a strongly alternative, or sustainable, agricultural paradigm. Non-response error was controlled using a comparison between early and late respondents as recommended by Lindner, Murphy, and Briers (2001) and Miller and Smith (1983).

Data from Qualtrics were imported into SPSS, version 16.0, and analyzed. Descriptive statistics were generated from the data and included frequencies and measures of central tendency. Descriptive statistics on Extension faculty's gender, age, educational background, farm versus non-farm backgrounds, State District locations, and Extension discipline were calculated. Independent t-tests for equality of means and one-way analysis of variance tests were used to analyze the data and determine if individual characteristics affected individual item responses and Sustainability Scores. Results were compared and contrasted between groups within the sample.

Finally, agricultural paradigmatic preferences amongst Florida Extension Agents were compared and contrasted. Existing relationships between individual characteristics and agricultural paradigmatic preferences were determined. Relationships between factors were discussed, as well as their implication for Florida's Extension Administration and the understanding of these preferences themselves. Suggestions for further research and application of these findings were devised.

Institutional Review Board

Federal regulations and Texas A&M University policies require prior approval for research that involves human subjects. The Texas A&M Office of University

Research Services and the Institutional Review Board conducts this review to protect the rights and welfare of human subjects involved in behavioral and biomedical research. This study was granted permission to proceed under exempt status. The protocol number assigned to this study was 2012-0246. Institutional Review Board Approval and amendments are presented in Appendix F. Waiver of documentation of consent was requested and approved; consent was indicated with participation in the survey. Participants were informed of their rights through the use of an information sheet (Appendix G).

Data Collection

Data collection followed Dillman et al.'s (2009) recommendations to include three electronic contacts: a combination introduction and letter of informed consent (Appendix A) and questionnaire mailing (Appendix B) and two replacement surveys for non-respondents (Appendix C and Appendix D). Replacement surveys were distributed at two and four weeks after the initial survey mailing (Dillman et al., 2009). Individuals were asked to input their name in order to verify that duplicate surveys were not received, and also to enter their name in a drawing as an incentive to respond.

To control for the threat of nonresponse error to external validity, the follow-up protocol for survey nonresponse used recommendations suggested by Lindner, Murphy, and Briers (2001) and Miller and Smith (1983). The researchers used the "Comparison of Early to Late Respondents" method (Lindner, Murphy, & Briers, 2001, p. 51) to confirm that data collected could be extrapolated to the entire population. This method was selected after it was determined that completing the survey instrument by telephone would be burdensome to the respondent, making comparison with nonresponders impractical.

Limitations

The limitations of this study are characteristic of other studies utilizing an electronic survey methodology. The response rate of 37% is considered to be quite low. While this response rate is characteristic of electronic survey-based studies, sample size may have been too small to allow for identification of certain relationships between variables. It is acknowledged that more relationships would have been identified had the response rate been higher.

This study was further limited to University of Florida Extension faculty who were employed during June and July of 2012, and further limited to individuals who chose to respond. Although this instrument was randomly distributed to individuals working in all disciplines, the majority of respondents belonged to agriculture and horticulture fields. This may be due to the fact that agricultural paradigms are most interesting to individuals working in closely-related areas, and resulted in few responses from faculty in other disciplines. The small sample size from other disciplines may have contributed to an inability to identify statistically significant relationships.

Exploratory factor analysis, which is discussed in Appendix H, resulted in a seven-factor solution which was limited by the small sample size. Sample sizes for factor analysis are generally suggested to be much larger than the one available for this study. Further, some factors loaded with only two items; reliability for these constructs would be expected to be quite low. A solution of fewer factors would be expected to have greater reliability in using this instrument for future studies.

Assumptions

In conducting this study, it was assumed that the sample was representative of the entire population. It was assumed that individuals completed the survey instrument accurately and honestly. Further, it was assumed that the researcher did not insert bias into instrumentation or statistical analysis procedures.

Definition of Terms

A list of terms utilized throughout this study is provided below.

ACAP Scale – Beus and Dunlap's (1991) Alternative and Conventional Agricultural Paradigm measurement tool.

Agricultural Paradigm – an individual's preferred model of agricultural practices.

Conventional Agriculture – a term used to differentiate from sustainable agriculture. This paradigm of agriculture is often characterized by large enterprises, uniform, high-yield crops, extensive use of fertilizers, pesticides, and energy inputs, high labor efficiency, and large capital investments (USDA, 1999b).

Conventionals – Individuals who support conventional agricultural practices.

Cooperative Extension Service – A network of land-grant universities, established to help individuals throughout the United States, by delivering research-based education at the local level (USDA NIFA, 2011).

Extension Agent – A member of a land-grant university's faculty who provides education at the local level, generally in some area of agriculture, horticulture, family and consumer sciences, or youth development and leadership (USDA NIFA, 2011).

In-service training – continuing educational opportunities delivered to Extension agents to further develop knowledge, provide them with current research updates in their area of specialization, and increase professional competency (Mincemoyer & Kelsey, 1999).

Moderates – Individuals who support both conventional and sustainable agricultural practices.

Modernized ACAP Scale – The updated version of Beus and Dunlap's (1991) Alternative and Conventional Agricultural Paradigm measurement tool, used for the research in this study. Also referred to as the Updated ACAP scale.

Sustainability Score – the sum of each individual's 24 responses on the updated ACAP scale, which could potentially range from 24 (most conventional) to 120 (most alternative).

Sustainable Agriculture – "an agriculture that can evolve indefinitely toward greater human utility, greater efficiency of resource use, and a balance with the environment that is favorable both to humans and to most other species" (Harwood, 1990). This term is used interchangeably with alternative agriculture.

Sustainables - Individuals who support sustainable agricultural practices.

UF / IFAS – University of Florida / Institute of Food and Agricultural Sciences.

MEASURING AGRICULTURAL PARADIGMATIC PREFERENCES: THE REDEVELOPMENT OF AN INSTRUMENT TO DETERMINE INDIVIDUAL AND COLLECTIVE PREFERENCES – A PILOT STUDY

Synopsis

The focus on sustainable agricultural practices is gaining momentum within academia and the land-grant university system. Many organizations, including Cooperative Extension services across the country, have adopted sustainability within their goals and objectives. Extension agents are expected to teach production methods that include sustainable agriculture, yet little is known about how Extension agents feel about this agricultural paradigm. In fact, it has been noted that individual perceptions do not necessarily reflect the values and opinions of the entity they represent.

The identification and understanding of Extension agent perceptions plays a critical role in program and organizational planning; however, very little is known about Extension agent perceptions on this topic. This research sought to further develop an instrument that could quantitatively measure Extension faculty members' agricultural paradigms. This study assessed a modernized Alternative and Conventional Agricultural Paradigm (ACAP) scale's reliability, validity, and ability to discriminate between known groups. Beus and Dunlap's ACAP instrument (1991) was updated and piloted with individuals belonging to known alternative and conventional agricultural paradigmatic groups. Twenty-eight individuals known to belong to specific paradigms completed the updated electronic ACAP scale, which contains twenty-four bipolar, scaled response items. Reliability was measured at 0.94 using Cronbach's alpha coefficient. This study offers a valid and reliable instrument useful in measuring individuals' agricultural paradigms. It is suggested that this instrument be used for future research with Extension faculty and other related populations.

Keywords: Agricultural paradigms, perceptions, sustainable agriculture, alternative agriculture, conventional agriculture, Extension agents.

Introduction

Educational organizations continue to adopt sustainability in their goals and objectives (Doerfert, 2011; Osborne, n.d; University of Florida, 2008) as producers and consumers alike demand that room be made for more sustainable agricultural systems (Gonzalez, 2011; H. Res. 2419, 2008). Extension agents have been identified as key facilitators of the adoption of this new paradigm (Allahyari et al.; 2009 Alonge & Martin, 1995).

The definitions for conventional agriculture are quite broad and may include uniform, high-yield crops; extensive use of fertilizers, pesticides, and energy inputs; high labor efficiency; large-scale systems; and large capital investments (USDA, 1999b). Advocates for conventional agriculture feel that this system is more effective at producing higher yields, which is an important claim to consider, given the rising world population (Avery, 2005; USDA, 1999b). Some advocates for conventional agriculture feel that the environmental claims made by the sustainable school of thought are untrue. Advocates for a sustainable, or alternative, agricultural system feel that it represents a critical solution to current agricultural practices, which are said to be economically, environmentally, and socially devastating (Feenstra, 2002; Hanson & Hendrickson, 2009; Rodriguez et al., 2009). For this study, sustainable agriculture was defined as “an agriculture that can evolve indefinitely toward greater human utility, greater efficiency of resource use, and a balance with the environment that is favorable both to humans and to most other species” (Harwood, 1990, p. 4). Given that multiple paradigms exist, it is suggested that room be made to accommodate alternative agriculture in conventional systems.

It is important to understand Extension agents’ perspectives towards agriculture in order to recognize an Extension system’s informal stance towards the topic. Relationships between agricultural production preferences and specific attitudes have been identified (Allen & Bernhardt, 1995; Beus & Dunlap, 1994); therefore, it is useful to look at Extension agents’ attitudes towards any topic they teach. Using this information, an individuals’ likelihood to teach toward one particular agricultural paradigm can be predicted, and training needs can be better understood.

A paradigm can be described as “an example that serves as pattern” and “the conceptual framework that permits the explanation and investigation of phenomena” (Paradigm, 1997, p. 989). It is suggested that an individual’s paradigm falls on a continuous scale at some point between a strong conventional agricultural preference and a more alternative or sustainable agricultural preference. For the purpose of this research, an individual’s agricultural paradigm was defined as their preferred model of agricultural practices.

The purpose of this study was to further develop and pilot an updated version of Beus and Dunlap's original ACAP instrument (1991), to generate a tool that can be used to measure and evaluate agricultural paradigms. It is suggested that an instrument that successfully identifies Extension agents' perceptions can be used to facilitate the development of educational programming and can help to establish a frame for discussions about policy and Extension education goals. Further, an understanding of Extension agents' feelings about agriculture provides opportunities to focus in-service training on areas of greatest importance. Ultimately, it is anticipated that the measurement of individual agricultural paradigms within a firm enables decision-makers to determine whether their organizational goals are reflected or rejected by their constituents.

Beus and Dunlap (1991) developed the Alternative-Conventional Agricultural Paradigm (ACAP) scale to measure paradigmatic views towards agriculture, and it was found to significantly discriminate between the two perspectives. However, the original ACAP scale was found to have outdated language and numerous double-barreled statements. The original paired Likert-type scale instrument contained twenty-four "bi-polar items that portray the respective positions of the two paradigms as anchor points on a multi-point scale" (Beus & Dunlap, 1991, p. 438). The scale was found to be "appropriate and useful in studies of the agricultural intelligentsia (agricultural scientists, farm policymakers, organizational leaders…)" (Jackson-Smith & Buttel, 2003, p. 513). Others, including Rasmussen and Kaltoft, have agreed that this instrument "is a suitable method for quantitative assessment of attitudes to agriculture" (2003, p. 2). However, it has not been updated in some time.

Methods

The instrument used in this pilot study was an updated electronic version of the original ACAP scale, which is presented in Appendix E. Dr. Curtis Beus granted the author permission to further develop this tool (personal communication, July 25, 2011). Beus and Dunlap's (1991) ACAP scale was further developed to clarify items and modernize individual statements. It was then converted into an electronic instrument through Qualtrics (Qualtrics Labs Inc., 2009).

Content validity of the ACAP scale had been previously confirmed by including "items covering the full spectrum of the agricultural debate" (Beus & Dunlap, 1991, p. 443). Content validity of the updated ACAP scale was further confirmed through a panel of individuals with extensive knowledge of current agricultural issues and agricultural and Extension education. Language was also clarified and modernized, with wording changed to apply to a broader group of respondents who may originate from rural or urban agricultural backgrounds. For example, the panel agreed that the word "farmer" was no longer under regular use for all individuals and substituted "grower", "landowner", and "producer" throughout the instrument. The expert panel included faculty from two land-grant universities. Panel members were selected based upon the following qualifications and positions: 1) Specialization in Extension education; 2) Proficiency and substantial research in program development and evaluation; 3) Contribution to the field of research evaluation methodology and reducing error in surveys; and 4) Specialization in sustainable agricultural systems. Experts' comments and recommendations were incorporated into the pilot version of the instrument.

Item reversal was not changed from the original ACAP scale; half of the items remained reversed in order to reduce response set bias (Weijtersa et al., 2009). The resulting ACAP scale (Appendix B) was used to measure agricultural paradigms in this pilot study. Based on the recommendations of Johanson and Brooks (2010), 24 - 30 respondents with 12 - 15 originating from each known group were sought. Twelve respondents belonging to the known conventional group and sixteen belonging to the alternative group were selected. Representatives from the conventional group were selected based on the authors' and subject experts' identification of conventional traits and practices. Representatives from the alternative group were selected based on their association with a sustainable or organic agricultural organization or the authors' and subject experts' identification of sustainable agricultural traits and practices. Pilot study participants resided in the southeastern United States.

Following data collection, the reversed items were transformed so that strongly conventional responses corresponded with "1" and most alternative responses corresponded with "5" on each of the twenty-four items. A Sustainability Score variable, which is the sum of each individual's 24 responses on the instrument, was created. The possible values for an individual's sustainability score is 24 (most conventional) to 120 (most alternative).

Results

Pilot study data was collected in May and June of 2012. The instrument was piloted with twenty-six individuals known to belong to each of the polar positions between conventional and alternative agriculture. The mean age was 50.32. Just over half (59.3%) were male and just over half (57.1%) had attended a land-grant college. Some (25.9%) own land on which they produce agricultural products to sell. The majority of respondents held either a bachelor's degree (28.6%) or a master's degree (25.0%). Some respondents (7.1%) had completed high school only; some (10.7%) held associate's degrees; and exactly one-fourth (25.0%) had achieved either doctoral or post-doctoral degrees (i.e. DVM).

The range of Sustainability Scores within this pilot study was 38 to 119. The range for individuals in the known conventional group was 38 to 81. The range for individuals in the known alternative group was 64 to 119. The alternative group (n=16) had a mean of 93.38 and standard deviation of 19.31. The conventional group (n=12) had a mean of 67.25 and a standard deviation of 12.35.

Levene's test was calculated to determine homogeneity of variance between the known alternative and conventional groups in Sustainability Score. The results of this test were statistically significant ($F_{Levene's}$= 4.407, df= 26, p= 0.046). Therefore, it was determined that variances between the two known- paradigmatic groups were statistically significant from one another. The results of this test are displayed in Table 4.

Table 4
Variance Between Known Conventional and Alternative Agricultural Paradigmatic Groups in Sustainability Score in a Pilot Test Evaluating the Reliability and Validity of a Modernized ACAP Scale

Measurement	Equality of Variance	
	F[1]	p
Sustainability Score	4.407	0.046

Note. [1]Levene's statistic – test of homogeneity of variance.

An independent t-test for equality of means between the two groups indicated that the Sustainability Score mean for the alternative known group (m=93.38) was significantly higher, or more sustainably-oriented, than those for the conventional known group (m= 67.25) (t=4.091, p<.001). The results of this test are presented in Table 5. The Cohen's d measure of effect size for this analysis was 1.60, between known groups on Sustainability Score. Based on Cohen's recommendations (1988), this value was interpreted as meaning a large magnitude of relationship. Effect size measures the strength of relationship and is independent of sample size. Based on the significance and effect size resulting from this independent t-test, it was determined that the updated ACAP scale does effectively discriminate between known groups.

Table 5
Independent t-test Comparing Known Agricultural Paradigmatic Group and Sustainability Score in a Pilot Test Evaluating the Reliability and Validity of a Modernized ACAP Scale

	Conventional Known Group	**Sustainable Known Group**	**df**	**t**	**p**	**d**
Sustainability Score	67.25[a]	93.38[b]	26	4.091	<.001	1.60
	(12.35)	(19.31)				

Note. Standard deviations in parentheses below means. Means with differing superscripts have significantly different Sustainability Scores at $p < 0.05$ based upon the independent t-test. Cohen's d value of greater than .80 indicates a large effect size (Cohen, 1988).

Reliability was measured at .94 using Cronbach's alpha coefficient. Cronbach's alpha is an excellent measure of reliability when using scales for research (Santos, 1999) and when measuring tests that are not "scored right versus wrong" (Fraenkel & Wallen, 2008, p. 158). On a scale from 0.00-1.00, with 1.00 being the greatest level of reliability, this coefficient of .939 is considered quite reliable, as a reliability coefficient greater than 0.70 is acceptable for use (Fraenkel & Wallen, 2008). As reported in Table 6, item-total statistics indicated that the removal of any of the individual items would not result in a substantially higher Cronbach's alpha value, and therefore, no items were removed (Radhakrishna, 2007).

Table 6
Summarized Scale Items and Cronbach's Alpha if Item Deleted on Modernized ACAP Scale in a Pilot Study to Determine Reliability and Validity of a Modernized ACAP Scale Instrument

	Summarized Scale Item	Cronbach's Alpha If Item Deleted
A	Meeting food needs with fewer farmers is positive versus negative	.936
B	Cropland should be managed for profits versus long-term capacity	.937
C	Dependence on high inputs of energy makes agriculture secure versus vulnerable	.936
D	The primary goal of profitability versus long-term condition of land	.937
E	The amount of agricultural land owned should not versus should be limited	.939
F	Science & policy should develop more technologies versus recognize production limits	.939
G	Success depends on modern technology versus experience & local knowledge	.933
H	Agricultural success will not versus will be affected by decline of small communities	.935
I	Less diverse, larger operations versus diverse, smaller operations meet agricultural needs best	.932
J	Farm traditions and culture are outdated versus essential to modern agriculture	.937
K	Farming is a business versus a way of life	.937
L	Growers should primarily use synthetic versus natural fertilizers and methods	.937
M	Less versus more people should participate in food production	.937
N	Modern agriculture is a cause of minor versus major environmental problems	.932
O	Landowners should farm as much as they can profitably versus personally	.934
P	Agricultural operations should specialize in few crops versus variety of crops	.938
Q	Soil and water should be used as needed. versus conserved	.936
R	Growers should purchase versus produce most of their goods and services	.939
S	The key to agricultural success lies in overcoming nature versus harmonizing with nature	.935
T	Producers should specialize in either versus both crops or livestock	.938
U	Production of food should take place at local versus national levels	.935
V	The successful grower has an above average standard of living versus enjoys growing crops	.937
W	Technology should replace versus enhance agricultural labor	.939

Table 6 Continued

	Summarized Scale Item	Cronbach's Alpha If Item Deleted
X	Meeting food needs with fewer farmers is positive versus negative The availability of food is evidence that agriculture is successful versus environmental consequences are evidence that it is not successful	.932
Mean inter-item correlation		.388
Cronbach's Alpha		.939

Note. Full statements can be viewed in Appendix B.

Conclusions and Discussion

Based on the reliability of the updated ACAP instrument, and its ability to effectively discriminate between the two known groups, it is suggested that this tool be used to collect data on populations of Extension agents and other educators. The data supports this instrument's use in measuring Extension agents' perceptions.

The original ACAP scale was said to identify constructs in "six major dimensions: Centralization vs. Decentralization; Dependence vs. Independence; Competition vs. Community; Domination of Nature vs. Harmony with Nature; Specialization vs. Diversity; and Exploitation vs. Restraint" (Beus & Dunlap, 1991, p. 443). While these constructs may be accurate of the dimensions represented within one's agricultural paradigm, they were never statistically tested through factor analysis. It is suggested that confirmatory factor analysis should be run to determine if the same dimensions arise from populations studied in the future. Field stated that the "larger of 100 subjects or five times the number of variables being analyzed" (2005, p.1) is the appropriate sample size for this analysis. This should be considered in future studies.

No adjustments to the instrument were determined to be necessary as a result of the pilot study. It is suggested that descriptive data of future samples, including gender, age, Extension or educational discipline, education attained, land-grant versus non-land-grant education, location, and farm versus non-farm backgrounds should be collected in combination with scale data. Results should be compared and contrasted with previous data reported from earlier studies conducted in Washington State with Beus and Dunlap's original instrument.

Finally, agricultural paradigmatic preferences amongst Extension and other educators should be compared and contrasted. Existing correlations discovered between individual characteristics and agricultural paradigmatic preferences can be reported. It is possible that factors that can predict an individual's agricultural paradigm may be identified. Correlations between factors can be discussed, as well as their implication for Extension administration and the understanding of these preferences themselves.
An understanding of individual paradigms within an Extension organization can allow administration and stakeholders to identify disparities between organizational objectives and personal preferences. The data collected with this updated ACAP scale can be used to set benchmarks and develop in-service training based on educators' paradigms. Ultimately, it is anticipated that this instrument allows for a better understanding of Extension educators and findings provides a tool that facilitates further research in the important area of agricultural education and sustainability.

AGRICULTURAL PARADIGMATIC PREFERENCES

AMONG FLORIDA EXTENSION AGENTS:

A DESCRIPTION OF INDIVIDUAL AND COLLECTIVE PREFERENCES

Synopsis

Significant focus on sustainable agriculture practices exists and is growing within the land-grant university system nationwide. This is evidenced by the adoption of agricultural sustainability as a goal of many Cooperative Extension services. Despite this fact, many colleges (including the University of Florida) have not evaluated the individual paradigms held by their faculty. The University of Florida Institute of Food and Agricultural Sciences Extension Statewide Goals and Focus Areas for 2008-2012 identified "Agricultural and Natural Resource Industry Profitability and the Sustainable Use of Environmental Resources" as a primary goal for small farms, agronomic row crops, sugarcane, rice, animal sciences, and fruit and vegetable crops. Florida Extension agents are positioned to serve in the roles of educators and resource-providers for individuals who wish to pursue sustainable agricultural production methods. Yet, little is known about Florida Extension agents' preferences towards sustainable or conventional agriculture, and it cannot be assumed that agents are in support of their organization's goals. This knowledge should play an important role in organizational planning.

To address this knowledge gap, this study utilized a reliable, valid, updated Alternative and Conventional Agricultural Paradigm (ACAP) scale instrument to

measure Florida Extension agents' agricultural preferences. The survey was completed by 69 individuals for a response rate of 37%. This study reports the results of this survey of Florida Extension Agents. Gender, age, educational background, farm versus non-farm background, state region, and extension discipline are reported. The mean Sustainability Score for Florida Extension agents was 80.64, out of a possible range of 24 – 120, with higher numbers corresponding with more sustainable agricultural paradigms. Sustainability scores were examined in relation to those generated from conventional and alternative known groups, as well as individuals' self-reported paradigms. Self-identified agricultural preferences including Moderates and Sustainables were found to be significantly different on Sustainability Score, as well as mean scores on three different constructs.

Keywords: Agricultural paradigms, perceptions, sustainable agriculture, alternative agriculture, conventional agriculture, Extension agents, Florida.

Introduction

Fueled by the adoption of sustainable agriculture, this paradigm of sustainability in agricultural practices is gaining momentum in the United States (Gonzalez, 2011; H. Res. 2419, 2008) and is considered a goal of many Cooperative Extension services and universities (Doerfert, 2011; Osborne, n.d; University of Florida, 2008). The University of Florida has named sustainability as one of its major goals (2008).

For the purpose of this research, sustainable, or alternative, agriculture was defined as "an agriculture that can evolve indefinitely toward greater human utility, greater efficiency of resource use, and a balance with the environment that is favorable both to humans and to most other species" (Harwood, 1990, p. 4). Sustainable agriculture, however, is difficult to define, as it takes on various definitions in different situations (Hanson & Hendrickson, 2009; Hanson et al., 1995; Jayaratne et al., 2001). The ambiguity of this term has been identified as a primary hindrance to its development (Keeney, 1990). Definitions for conventional agriculture are even broader. Those adhering to a more conventional preference may support the use of larger operations, uniform, high-yield crops, extensive use of fertilizers, pesticides, and energy inputs, high labor efficiency, and large capital investments (USDA, 1999b). Proponents of a sustainable, or alternative, agricultural preference feel that it represents a critical solution to conventional agricultural practices, which have been accused of being harmful to our economy, society, and environment (Feenstra, 2002; Hanson & Hendrickson, 2009; Rodriguez et al., 2009). One's agricultural preference can be described in terms of their agricultural paradigm, which was defined as the preferred model of agricultural practices for the purpose of this research. An individual's agricultural paradigm will fall on a continuous scale between a strong conventional preference and a more alternative or sustainable preference, but the two are not mutually exclusive.

To date, little is known about Florida Extension agents' feelings about sustainable or conventional agriculture. Extension agents, such as those employed by the University of Florida, are in a position to serve as educators and sources of information for individuals who wish to pursue sustainable agricultural production methods. It is known that a strong relationship exists between one's specific attitudes and production preferences (Allen & Bernhardt, 1995; Beus & Dunlap, 1994) and it cannot be assumed that agents are in agreement with or supportive of their organization's goals (Minarovic & Mueller, 2000), making a case for the importance of understanding individual paradigms within the collective institution (Eveland, 1986). The identification of individual agricultural paradigms may play an important role in organizational planning within an Extension system. To address this knowledge gap, the current study aimed to measure and document Florida Extension agents' agricultural paradigms, with a goal of better understanding this population, in order to confirm or invalidate the Extension faculty's subscription to the University of Florida's goal of sustainability in agriculture.

This study improved upon Beus and Dunlap's Alternative and Conventional Agricultural Paradigm (ACAP) scale (1991) which was found to be valid and reliable, and effective in quantitatively measuring agricultural attitudes (Jackson-Smith & Buttel, 2003; Rasmussen & Kaltoft, 2003). It is anticipated that an accurate and rich picture of Florida Extension agents' attitudes towards agricultural practices gleaned from this study supports the future development of in-service training, educational programming, and organizational policy and goal setting.

The modernized ACAP scale (Appendix B) was updated from its original version (Beus & Dunlap, 1991) and found to be valid by a panel of subject and research experts. It was converted into a web-based survey instrument through Qualtrics (Qualtrics Labs Inc., 2009). The survey was found to be reliable with a Cronbach's alpha coefficient of 0.939 in a pilot test of 26 individuals belonging to known paradigmatic groups. Further, it was found to discriminate effectively between the two paradigms ($t=4.091$, $p= .001$), making it a useful tool in quantitatively assessing one's attitude towards agricultural practices. Respondents in the pilot test did not belong to the final sample.

Methods

The target population of this study was the entire University of Florida Extension faculty, which consisted of 305 agents in numerous disciplines. The researcher used a random sample (n=188). The number surveyed was based on the desired sample size for a population of 300, which is 169 (Krejcie & Morgan, 1970). Due to the fact that the actual population was slightly above 300, and low response was anticipated, the actual sample size was increased from the recommendation. The modernized electronic version of Beus and Dunlap's ACAP scale was used to collect individual preferences between two differing statements on a five-point scale. In addition, information about each respondent's age, gender, area of specialization, educational background, farm or non-farm background, attendance of a land-grant college, and location in the state was collected. Respondents were asked to self-report their perceived individual agricultural paradigm using one of the following characterizations: a strong supporter of sustainable agriculture practices, a strong supporter of both conventional and sustainable agriculture, or a strong supporter of conventional agriculture. The survey instrument is presented in Appendix B.

Respondents were asked to complete the electronic survey via their University of Florida email address. Data collection was based on Dillman et al.'s (2009) recommendations to include three electronic contacts: a combination introductory letter and questionnaire mailing and two replacement surveys for non-respondents.

Replacement surveys were distributed at two and four weeks after the initial survey was sent; the survey remained open for a total of 36 days. The researcher collected 69 completed surveys and achieved a response rate of 37%. Although this response rate is considerably low, it is fairly standard for a web-based survey designed to evaluate participant needs and perceptions, and still allows for the provision of a great deal of information (Archer, 2008).

To address a response rate of less than 85% and control for non-response error, early and late respondents were compared (Lindner et al., 2001; Miller & Smith, 1983). This method was selected over comparison with non-respondents because it was determined that an individual would not likely be willing to complete this fairly complex instrument over the phone. Early respondents were defined as those who responded to the first distribution of the survey. Late respondents were defined as those who responded after receiving either the first or second reminder.

Levene's test was calculated to determine homogeneity in variances between early and late respondents. The results of this test were not statistically significant ($F = 1.040$, $p = 0.311$), indicating that the variances of the two groups were not different from each other. The results of this test are presented in Table 7.

Table 7
Variance Between Early and Late Respondents in Sustainability Score in a Study To Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel

Measurement	Equality of Variance	
	F[1]	p
Sustainability Score	1.040	0.311

Note. [1]Levene's statistic – test of homogeneity of variance.

The two groups' mean Sustainability Scores were compared using an independent t-test for equality of means, as reported in Table 8. The test indicated that early and late respondents' Sustainability Score means were equal ($t = 0.893$, $p = 0.375$). Based on the independent t-test, it was concluded that there was no difference between early and late respondents. Late respondents and non-respondents have been found to be similar (Miller & Smith, 1983), meaning that the results of this study can be generalized to the entire population (Lindner et al., 2001; Radhakrishna & Doamekpor, 2008).

Table 8
Independent t-test Comparing Early Respondents versus Late Respondents on Sustainability Score in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variances)

	Early Respondents	**Late Respondents**	**df**	**t**	**p**
Sustainability Score	78.29	82.03	67	8.93	.375
	(14.06)	(11.25)			

Note. Standard deviations in parentheses below means.

The sum of each individual's 24 responses on the instrument was generated into a Sustainability Score variable. The potential values for an individual's Sustainability Score was 24 (most conventional) to 120 (most alternative). These scores were also compared between the University of Florida Extension faculty's self-identified agricultural paradigmatic groups. Exploratory factor analysis was conducted to identify emerging constructs.

Results

Data was collected during June and July of 2012. Reliability of the instrument was measured at .871 using Cronbach's alpha coefficient, which is well above the minimum standard of .700 (Fraenkel & Wallen, 2008). Item-total statistics indicated that the removal of any of the individual items would not result in a substantially higher Cronbach's alpha value, and therefore, all items were included in the data analysis (Radhakrishna, 2007). Item-total statistics are reported in Table 9.

Table 9
Summarized Scale Items and Cronbach's Alpha if Item Deleted on Modernized ACAP Scale in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel

	Summarized Scale Item	**Cronbach's Alpha If Item Deleted**
A	Meeting food needs with fewer farmers is positive versus negative	.867
B	Cropland should be managed for profits versus long-term capacity	.865
C	Dependence on high inputs of energy makes agriculture secure versus vulnerable	.866
D	The primary goal of profitability versus long-term condition of land	.864
E	The amount of agricultural land owned should not versus should be limited	.869
F	Science & policy should develop more technologies versus recognize production limits	.864
G	Success depends on modern technology versus experience & local knowledge	.865
H	Agricultural success will not versus will be affected by decline of small communities	.868
I	Less diverse, larger operations versus diverse, smaller operations meet agricultural needs best	.859
J	Farm traditions and culture are outdated versus essential to modern agriculture	.874
K	Farming is a business versus a way of life	.874
L	Growers should primarily use synthetic versus natural fertilizers and methods	.862
M	Less versus more people should participate in food production	.868
N	Modern agriculture is a cause of minor versus major environmental problems	.864
O	Landowners should farm as much as they can profitably versus personally	.864
P	Agricultural operations should specialize in few crops versus variety of crops	.868
Q	Soil and water should be used as needed. versus conserved	.861
R	Growers should purchase versus produce most of their goods and services	.867
S	The key to agricultural success lies in overcoming nature versus harmonizing with nature	.859
T	Producers should specialize in either versus both crops or livestock	.875
U	Production of food should take place at local versus national levels	.864
V	The successful grower has an above average standard of living versus enjoys growing crops	.871
W	Technology should replace versus enhance agricultural labor	.864

Table 9 Continued

	Summarized Scale Item	Cronbach's Alpha If Item Deleted
X	Meeting food needs with fewer farmers is positive versus negative The availability of food is evidence that agriculture is successful versus environmental consequences are evidence that it is not successful	.862
Mean inter-item correlation		.219
Cronbach's Alpha		.871

Note. Full statements can be viewed in Appendix B.

Measures of central tendency and frequencies were computed to summarize demographic and background characteristics of the responding sample. The mean age of respondents was 44.93. Males comprised 38.5% (n=25) while females comprised 61.5% (n=40). A large percentage (86.6%, n=58) of the respondents indicated they had attended a land-grant college. A small percentage (14.9%, n=10) indicated they currently own land on which they produce agricultural products to sell. Nearly one-third (29.9%, n=20) originated from a farming background. All respondents (n=68) held a minimum of a bachelor's degree, while most (66.2%, n=45) held master's degrees and some (13.2%, n=9) had achieved doctoral degrees.

Geographically, respondents were located in each of the Florida Extension Districts: 34.3% (n=23) in the South; 23.9% (n=16) in Northeast; 13.4% (n=9) in the Northwest; 14.9% (n=10) in the South Central; and 13.4% (n=9) in the Central. The sample was composed of Extension faculty from all disciplines: 7.2% (n=19) worked primarily in Agriculture; 32.4% (n=22) worked primarily in Horticulture; 16.2% (n=11) worked primarily in Family and Consumer Science; 16.2% (n=11) worked primarily in 4-H, and 7.4% worked in other disciplines, namely Sea Grant (n=2) and Natural Resources (n=2). Detailed background characteristics and demographic data are reported in Table 10. The range of Sustainability Scores for all respondents was 40 to 114. The mean was 80.64 with a standard deviation of 12.74.

Table 10
Demographic and Background Characteristics in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel

Gender	**n**	**% of Total**
Female	40	61.5
Male	25	38.5
Extension Discipline	**n**	**% of Total**
4-H	11	16.2
Agriculture	19	28.0
Horticulture	22	32.4
Family/Consumer Sci.	11	16.2
Other	5	7.4
Florida Extension District	**n**	**% of Total**
Northwest	9	13.4
Northeast	16	23.9
Central	9	13.4
South-Central	10	14.9
South	23	34.3
Highest Education Attained	**n**	**% of Total**
4-Year Degree	14	20.6
Masters Degree	45	66.2
Doctoral Degree	9	13.2
Land-Grant Education	**n**	**% of Total**
Attended	58	86.6
Did Not Attend	9	13.4

Table 10 Continued

Age	n	% of Total
20-29	10	16.7
30-39	11	18.3
40-49	14	23.3
50-59	19	31.7
60+	6	10.0
Upbringing	**n**	**% of Total**
Farm	20	29.9
Non-Farm	47	70.1
Agricultural Land Ownership	**n**	**% of Total**
Own Agricultural Land	10	14.9
Do Not Own Ag. Land	57	85.1
Self-Reported Paradigm	**n**	**% of Total**
Sustainables	21	30.4
Moderates	45	65.2
Conventionals	3	4.3

Note. For items with less than 100% response rate, percentages are based on responding total, not sample total.

Exploratory factor analysis yielded seven factors. These seven constructs explained 66.18% of the variance. Detailed results and discussion of the exploratory factor analysis are presented in Appendix H. The seven factors identified were named: a) Use of Natural Resources; b) View of Modern Agriculture; c) Automation of Agriculture; d) Size and Scale of Production; e) Agriculture in the Community; f) View of the Successful Grower; and g) Diversity in Agriculture. It is acknowledged that this solution was a preliminary finding based on a very small sample size. Two of the identified constructs, View of Modern Agriculture and Agriculture in the Community factors, were found to have extremely low reliability. The researcher cautions the reader in interpreting results specifically related to these constructs, as further study needs to be conducted to validate these or identify alternative constructs.

Respondents were asked to self-report their perceived individual agricultural paradigm by selecting one of the following options to identify themselves: a) strong supporters of sustainable agriculture practices; b) strong supporters of conventional agriculture practices; or c) supporters of both paradigms. These self-identified paradigmatic groups were labelled as Sustainables, Conventionals, and Moderates. The range of Sustainability Scores for the Sustainables was 59 to 114 (m=87.38, SD=13.21). The range of Sustainability Scores for Moderates was 56 to 101 (m=78.91, SD=9.76). The range of Sustainability Scores for Conventionals was 40 to 82 (m=59.33, SD=21.20). Based upon the data, a very limited number of Extension professionals in Florida consider themselves to be conventional (n=3). It was determined that robust statistical comparisons could not be conducted due to the very small size of this group; therefore, the Conventionals were not included in further assessments.

Levene's statistic was calculated to determine homogeneity of variances between Moderates and Sustainables. The results of this test were not statistically significant for: Sustainability Score ($F_{Levene's}$= 3.266 , df= 64, p= 0.075), Use of Natural Resources Score ($F_{Levene's}$=.499, df= 2,65, p= .483), View of Modern Agriculture Score ($F_{Levene's}$=.605, df= 2,65, p= .439), Size and Scale of Production Score ($F_{Levene's}$= 2.786, df= 2,65, p= .100), Automation of Agriculture Score ($F_{Levene's}$=.921, df= 2,65, p= .341), Agriculture in the Community Score ($F_{Levene's}$=.507, df= 2,65, p= .479), View of the Successful Grower Score ($F_{Levene's}$=.045, df= 2,65, p= .832), or Diversity in Agriculture Score ($F_{Levene's}$=1.529, df= 2,65, p= .221). These results indicated that variances between the two self-reported paradigmatic groups were not statistically different from one another on any of these measures. The results of this test are displayed in Table 11.

Table 11
Variance Between Self-Reported Moderates and Sustainables in Sustainability Score and Individual Construct Scores in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Faculty

Measurement	Equality of Variance	
	F^1	p
Sustainability Score	3.266	0.075
	F^1	p
Use of Natural Resources	.499	.483
View of Modern	F^1	p
Agriculture	.605	.439
	F^1	p
Automation of Agriculture	.921	.341
Size and Scale of	F^1	p
Production	2.786	.100
Agriculture in the	F^1	p
Community	.507	.479
View of the Successful	F^1	p
Grower	.045	.832
	F^1	p
Diversity in Agriculture	1.529	.221

Note. [1]Levene's statistic – test of homogeneity of variance.

An independent t-test for equality of means was used to compare Sustainability Scores, and construct means between Sustainables and Moderates. There was a significant difference in the scores between the Moderates (M=78.91, SD=9.76) and Sustainables (M=87.38, SD=13.21); t (64)=2.93, p = 0.005. These results indicate that repondents' self-identification matches their agricultural paradigm score. These results, which are reported in Table 12, suggest that Florida Extension faculty members are able to accurately gauge their personal agricultural paradigm, whether it be towards a more moderate or sustainable paradigm. Further, it was discovered that Moderates and Sustainables differed on three factors: Use of Natural Resources, View of Modern Agriculture, and View of the Successful Grower. The Moderates scored significantly lower, or more conventionally, on each of these items, as reported in Table 12. These significant findings are paired with medium effect sizes, as measured by Cohen's d (Cohen, 1988).

Table 12
Independent t-test Comparing Sustainability Scores and Component Scores of Florida Extension Faculty by Self-Reported Paradigmatic Group (Equal Variances) in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel

Sustainability Score	**Moderates**	**Sustainables**	**df**	**t**	**p**	**d**
	78.91	87.38	64	2.93	.005	.73
	(9.76)	(13.21)				
Use of Natural Resources	**Moderates**	**Sustainables**	**df**	**t**	**p**	**d**
	3.63	4.09	64	2.72	.008	.68
	(.67)	(.57)				
View of Modern Agriculture[a]	**Moderates**	**Sustainables**	**df**	**t**	**p**	**d**
	2.61	3.05	64	2.76	.008	.69
	(.56)	(.68)				
Automation of Agriculture	**Moderates**	**Sustainables**	**df**	**t**	**p**	
	3.17	3.17	64	.02	.985	
	(.79)	(.89)				
Size and Scale of Production	**Moderates**	**Sustainables**	**df**	**t**	**p**	
	3.09	3.46	64	1.99	.051	
	(.64)	(.83)				

Table 12 Continued

	Moderates	Sustainables	df	t	p	
Agriculture in the Community[a]	3.56	3.88	64	1.73	.089	
	(.75)	(.63)				
	3.42	3.52	64	.49	.623	
	(.69)	(.94)				
	Moderates	**Sustainables**	**df**	**t**	**p**	**d**
View of the Successful Grower	2.92	3.48	64	2.57	.013	.64
	(.81)	(.83)				
	Moderates	**Sustainables**	**df**	**t**	**p**	
Diversity in Agriculture	3.42	3.52	64	.49	.623	
	(.69)	(.94)				

Note. Standard Deviations appear in parentheses below means. Cohen's d value greater than .50 and less than .80 indicates a medium effect size (Cohen, 1988).
[a]*View of Modern Agriculture* and *Agriculture in the Community* factors were found to have extremely low reliability. The reader should be cautioned in interpreting results as they relate to factor analysis based on the small sample size available and the low reliability on two of the constructs.

Conclusions and Discussion

Extension professionals' view of agriculture and their feelings towards the concept of sustainability are critical in developing programs in alternative agriculture (Minarovic and Mueller, 2000). During a time when education was exclusive, the land-grant university system was established to serve all members of American communities and to deliver quality, research-based information to people regardless of their location, finances, or any other demographic characteristic (Sanderson, 1988; USDA NIFA, 2011). One current major goal of the University of Florida's Institute of Food and Agricultural Resources is sustainability of environmental resources in agriculture (2008). This was the first study known to the researcher in which University of Florida

Extension Faculty's agricultural paradigmatic preferences were quantitatively measured, and an accurate and valuable view of this population is offered. An understanding of individual paradigms within an Extension organization can allow administration and stakeholders to identify disparities between organizational objectives and faculty's personal paradigms.

The Florida Extension faculty's mean Sustainability Score (80.64) emerged slightly above the median of 72 between the most conventional (24) and alternative (120) potential scores. The majority of respondents (65.2%) indicated that they consider themselves supporters of both conventional and alternative agricultural practices. The findings suggest that the majority (95.6%) of University of Florida Extension faculty members adhere to a paradigmatic group that may be labeled as either Sustainables or Moderates. Very few (4.4%) fell into a group labeled as Conventionals. Based upon this data, it was determined that faculty are accepting of a sustainable agricultural paradigm, and prepared to facilitate teaching about sustainable agricultural practices when appropriate.

When asked to report alignment with a strong paradigm or a combination of the two, faculty grouped themselves into statistically different groups. This finding suggested that there is validity in an individual's measurement of their personal agricultural paradigm. This finding supports implications that future studies could be undertaken using simple, self-reporting instruments.

Exploratory Factor Analysis identified seven constructs that explained 68.1% of the variance. These constructs and their corresponding Cronbach's alpha coefficients are as follows: a) Use of Natural Resources (.852); b) View of Modern Agriculture (.436); c) Automation of Agriculture (.657); d) Size and Scale of Production (.652); e) Agriculture in the Community (.213); f) View of the Successful Grower (.547); and g) Diversity in Agriculture (.581). Although some have recommended sample sizes of at least 500 (Comfrey & Lee, 1973), or large ratios of 5 subjects (Field, 2005) up to 20 subjects (Costello & Osborne, 2005) per each item under analysis, others have found that samples of less than 50 (Winter, Dodou, & Wieringa, 2009) can provide valid solutions to exploratory factor analysis. The sample used in this research (n=69) exceeded those used in other accurate factor analyses (Winter et al., 2009). It is suggested that the seven constructs identified in this study may be valid, given previous findings that there is no true minimum size and that quality results could emerge from small sample sizes when communalities are strong (Hogarty, Hines, Kromrey, Ferron & Mumford, 2005; MacCallum, Widaman, Zhang, & Hong, 2001). It is also suggested that the solution offered by this exploratory factor analysis is preliminary, and should be replicated with a larger sample size to determine if this instrument identifies the same constructs within larger populations, or different constructs with greater reliability.

The Sustainables scored higher, or more sustainably, than did the Moderates, on three constructs: a) Use of Natural Resources; b) View of Modern Agriculture; and c) View of the Successful Grower. This data suggested that there are significantly differing opinions on facets that relate to the use and domination of natural resources, as well as how a successful production operation should be managed.

It is suggested that further research be conducted to build on the findings of this study. This research should be replicated with other land-grant university Extension faculty to determine paradigms within other locales. Resulting data may indicate whether there is a national trend towards the sustainable paradigm or if University of Florida faculty are different from others throughout the nation. A comparison between agricultural professionals in other countries, using the modernized ACAP scale, would also be beneficial to understanding perspectives and preferences on a global scale.

It is further suggested that qualitative research may be conducted with the University of Florida Extension faculty. Primarily, this population's perceived barriers to teaching and adopting sustainable agricultural paradigms should be explored. Others (Agunga & Igodan, 2007; Hanson et al., 1995; Rodrigues et al., 2009) have identified numerous barriers to the adoption of sustainable agriculture within the Extension system as well as faculty's numerous in-service training needs in this area (Agunga, 1995). It should be determined whether University of Florida Extension faculty perceives the same barriers and have the same needs that previous studies have suggested.

Several recommendations for practice have emerged from this study. First, the University of Florida Extension administration should proceed with confidence in knowing that the majority of their Extension faculty are either Sustainables or Moderates. Second, this Extension agent population should be provided with further educational tools and training related to sustainable agricultural practices so that their teachings on this topic may be enhanced. Finally, it is suggested that University of Florida faculty are prepared, and should step forward from their previous role as secondary sources of information about sustainable agriculture (Agunga & Igodan, 2007) to primary facilitators of this paradigm. The discovery of the University of Florida Extension faculty's perceptions may be an indication that they are prepared to carry out this task (Jayaratne et al., 2001).

A primary goal of this study was to measure individual paradigmatic preferences, under the theoretical framework that individual values do not necessarily reflect the objectives set by their organization (Minarovic & Mueller, 2000). The findings indicate that University of Florida Extension Faculty aligns strongly with Moderates and Sustainables. Very few of the faculty were considered Conventionals. The orientation of Florida Extension agents' paradigmatic preferences towards a sustainable paradigm indicates that these individuals are well-prepared to operate in a historically-conventional system while making the essential room for sustainable agriculture.

COMPARING AND CONTRASTING THE AGRICULTURAL PARADIGMATIC PREFERENCES AMONG FLORIDA EXTENSION AGENTS: RELATING PREFERENCES TO INDIVIDUAL CHARACTERISTICS

Synopsis

Sustainable agriculture has been embraced by policy in the United States (USDA, 1999b) and in education by land-grant universities (Niewolny et al., 2012; USDA, 1999a), including the University of Florida (Ferguson et al., 2006). Extension agents have been identified as major catalysts for the shift from a conventional agricultural system to one that supports sustainable, or alternative, agriculture. There is a true paradigmatic shift represented by the emergence of alternative agriculture (Abaidoo & Dickinson, 2002) that reflects an actual shift in values and attitudes, not just simple changes in production practices.

While Extension faculty have been identified as change agents in the shift to a more sustainable agriculture, little is known regarding Florida Extension agents' perceptions towards this topic. It is known that an institution's goals may not be represented by the actions and beliefs of its staff members (Eveland, 1986; Minarovic & Mueller, 2000). This knowledge gap needed to be addressed. An understanding of Extension agents' agricultural paradigms plays a critical role in program and organizational planning. For example, it would be inappropriate to proceed with sustainable agricultural training for staff if it was discovered that the agents were unsupportive of sustainable agriculture. Additionally, it would be erroneous to assume

that sustainable agricultural goals set by the University would be fulfilled by individuals with conflicting values.

To address what was not currently known, this study utilized a modernized, reliable, and valid Alternative and Conventional Agricultural Paradigm (ACAP) scale instrument to quantitatively measure Extension agents' agricultural paradigms. There were 69 University of Florida Extension Agents who completed this survey instrument. The mean Sustainability Score for Florida Extension agents was 80.64 within a potential range from 24 – 120 where higher values indicate a stronger alignment with sustainable agriculture. Sustainability Scores were examined in relation to gender, age, educational background, farm versus non-farm background, state region, and Extension discipline. A comparison between early and late respondents was used to control for nonresponse error. There was no significant difference in agricultural paradigm based on gender, age, Florida Extension District, education, agricultural land ownership, farming background, or discipline. However, significant differences within the constructs of: Size and Scale of Production and Use of Natural Resources were identified between gender groups and disciplines, respectively.

Keywords: Agricultural paradigms, perceptions, sustainable agriculture, alternative agriculture, conventional agriculture, Extension agents.

Introduction

Although many definitions exist, it is generally accepted that sustainable agriculture includes components of natural resource preservation, and economic, social, and environmental balance (Feenstra, 1997; Hanson & Hendrickson, 2009; Ikert, 1998;

Rodriguez et al., 2009; UCS, 2007; USDA, 1999b). For the purpose of this research sustainable agriculture is defined as "an agriculture that can evolve indefinitely toward greater human utility, greater efficiency of resource use, and a balance with the environment that is favorable both to humans and to most other species" (Harwood, 1990, p. 4). Simply, sustainable agriculture protects the environment and supports the community while being profitable to the producer.

Sustainability in agriculture is gaining momentum in the United States (Gonzalez, 2011; H. Res. 2419, 2008) and is considered a goal of many Cooperative Extension services and universities (Doerfert, 2011; Osborne, n.d; University of Florida, 2008). The University of Florida has exhibited support for sustainable agriculture by including this in its major goals (2008) and offering academic curriculum on this topic (Ferguson et al., 2006). Additionally, the University was named as one of the top six schools in the country in teaching this agricultural paradigm (OFRF, 2012). Extension agents such as those employed by the University of Florida have been identified as key sources of information for producers who wish to pursue alternative agricultural methods. However, it cannot be assumed that agents are in agreement with or supportive of their organization's goals (Minarovic & Mueller, 2000), making a case for the importance of measuring individual preferences within a collective institution (Eveland, 1986). Prior to developing responses to concerns about food production and the environment based in policy and education, it is acknowledged that an institution must obtain knowledge about its individuals' paradigmatic views (Abaidoo & Dickinson, 2002).

An agricultural paradigm was defined as an individual's preferred model of agricultural practices for the purpose of this research. An Extension agent's preferred agricultural paradigm will fall at some point between a strong alternative preference and a more conventional preference. Although it has been suggested that the discovery of individual perceptions is a critical area of research for all Extension systems (Agunga, 1995), little was known about Florida Extension agents' agricultural paradigms. This research sought to address this gap in knowledge.

Methods

The purpose of this study was to assess Florida Extension agents' agricultural paradigms and determine if there was any corresponding relationship with their demographic and background characteristics. An updated version of Beus and Dunlap's Alternative and Conventional Agricultural Paradigm (ACAP) scale (1991) was used for this study (Appendix B). The original instrument was previously found to effectively measure agricultural preferences (Jackson-Smith & Buttel, 2003; Rasmussen & Kaltoft, 2003). However, the current researcher identified a number of errors and language that would be considered outdated or exclusive to some, and the instrument was revised accordingly. In a pilot study, the updated ACAP scale was found be valid and reliable, with a Cronbach's alpha coefficient of 0.94. It was also found to effectively discriminate between known groups belonging to polar paradigmatic groups.

The updated ACAP scale was found to measure seven constructs within the alternative and conventional agricultural sphere. These factors are presented in Table

13. This research supports future development of in-service training, educational programming, and organizational policy- and goal- setting.

Table 13
Exploratory Factor Analysis Solution in a Study Exploring the Agricultural Paradigmatic Preferences Held by University of Florida Extension Faculty

Named Construct	**Number of Items**	**Corresponding Items**	**Cronbach's alpha**
Use of Natural Resources	8	O, S, B, Q, D, C, L, W	.852
View of Modern Agriculture[a]	4	N, X, J, E	.436[a]
Automation of Agriculture	3	G, F, M	.657
Size and Scale of Production	3	A, U, I	.652
Agriculture in the Community[a]	2	K, H	.213[a]
View of the Successful Grower	2	V, R	.547
Diversity in Agriculture	2	P, T	.581

[a]View of Modern Agriculture and Agriculture in the Community factors were found to have extremely low reliability. The reader should be cautioned in interpreting results as they relate to factor analysis in relation to the small sample size available and the low reliability on two of the constructs.

The population of 305 University of Florida Extension agents in all disciplines was the target of this study. Based on Krejcie and Morgan's (1970) guidelines for a sample size of 169 for a population of 300, a random sample of 188 Extension agents was selected. Respondents were sent an electronic survey via their University email address and asked to complete a series of twenty-four paired Likert-type scale items, each of which posed two viewpoints and provided five possible levels of agreement at points in between. Respondents were also asked to provide information about their gender, age, area of specialization, educational background, farm or non-farm background, attendance of a land-grant college, and location in the state.

Based on Dillman et al.'s (2009) recommendations, data collection included three total electronic contacts. The first contact consisted of an introductory letter and survey provision. This was followed-up both two and four weeks later with replacement surveys for non-respondents. A response rate of 37% was achieved through the collection of 69 completed surveys.

The response rate was less than the desired minimum of 85%; to control for non-response error, the early and late respondent comparison method was utilized (Lindner et al., 2001; Miller & Smith, 1983). This method was chosen due to the fact that conducting this survey via phone would have been quite burdensome for non-respondents, making comparison with non-respondents impractical. Late respondents were labeled as those who completed the instrument after receiving either one or two survey replacements. Early respondents were labeled as those who responded to the original survey instrument. Early and late respondents were compared with an independent t-test. Based on Leven's test ($F= 1.040$, $p= 0.311$) it was determined that there was no significant difference in variance between early and late respondents.

Following data collection, individual preferences on each of the twenty-four items were coded with numeric values from 1 through 5, with 1 indicating a strongly conventional view and 5 indicating a strongly alterative paradigm. The sum of these values resulted in a Sustainability Score variable. An individual's Sustainability Score could have potentially ranged from a low value of 24 (most conventional) to a high value of 120 (most alternative).

The independent t-test for equality of means between the two groups confirmed that the Sustainability Score means were equal ($t = 0.893$, $p = 0.375$). Therefore, it was concluded that there was no difference between late and early respondents. Non-respondents and late respondents have been found to be comparable in their survey responses (Miller & Smith, 1983). This enabled the researcher to generalize the results of this study to the entire population (Lindner, Murphy, & Briers, 2001; Radhakrishna & Doamekpor, 2008).

Results

Surveys were distributed and study data was collected during June and July of 2012. Cronbach's alpha coefficient was measured at .871 for instrument reliability, which was determined to be satisfactory (Fraenkel & Wallen, 2008). All individual items were used in data analysis, as the removal of any individual items would not result in a substantially higher Cronbach's alpha value (Radhakrishna, 2007).

The mean age of respondents was 44.93, with a range from 23 – 72. Slightly more than half of respondents were female (58%), and most held master's Degrees (65.2%). The sample represented all Extension disciplines: Agriculture (7.2%); Horticulture (31.9%); Family and Consumer Science (15.9%); 4-H (15.9%); Sea Grant (3.6%), and Natural Resources (3.6%). Most Extension faculty had attended a land-grant college (84.1%). Geographically, the sample was composed of agents located in each of the five Florida Extension Districts: South(33.3%); Northeast (23.2%);

Northwest (13%); South Central (14.5%); and Central (13%). Sustainability Scores ranged from 40 to 114. Sustainability Scores by variable are reported in Table 14.

Table 14
Sustainability Score by Variable in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel

Variable	**N**	**Mean Sustainability Score**	**Standard Deviation**
Total Sample	69	80.64	12.74
District			
Northwest	9	79.67	7.55
Northeast	16	80.19	11.47
Central	9	79.44	11.25
South-Central	10	89.90	20.22
South	23	78.57	11.18
Totals	67		
Gender			
Male	25	77.44	14.97
Female	40	82.88	10.23
Totals	65		
Age			
20-29	10	76.60	9.00
30-39	11	83.82	10.25
40-49	14	83.00	7.85
50-59	19	80.16	12.00
60+	6	90.50	17.35
Totals	60		
Highest Education Attained			
4-Year Degree	14	81.36	7.29
Masters Degree	45	81.36	12.80
Doctorate	9	77.22	18.90
Totals	68		
Education			
Land-Grant	58	80.12	13.15
Non-Land Grant	9	85.78	9.74
Totals	67		

Table 14 Continued

Variable	N	Mean Sustainability Score	Standard Deviation
Background			
Farm	20	78.85	11.93
Non-Farm	47	81.55	13.25
Totals	67		
Agricultural Land Ownership Status			
Owners	10	81.00	8.68
Non-Owners	57	80.42	13.23
Totals	67		

Levene's statistic was calculated to determine homogeneity of variances between gender groups. The results of this test were not statistically significant for: Sustainability Score ($F_{Levene's}$= 1.441, df= 63, p= 0.087), Use of Natural Resources Score ($F_{Levene's}$=2.380, df= 2,65, p= .128), View of Modern Agriculture Score ($F_{Levene's}$=1.189, df= 2,65, p= .280), Automation of Agriculture Score ($F_{Levene's}$=.128, df= 2,65, p= .722), Size and Scale of Production Score ($F_{Levene's}$= 3.310, df= 2,65, p= .074), Agriculture in the Community Score ($F_{Levene's}$= .019, df= 2,65, p= .892), View of the Successful Grower Score ($F_{Levene's}$= .002, df= 2,65, p= .966), or Diversity in Agriculture Score ($F_{Levene's}$= .345, df= 2,65, p= .559), indicating that variances between gender groups were not different from one another on any of these measures. The results of this test are displayed in Table 15.

Table 15
Variance Between Gender Group in Sustainability Score and Individual Construct Scores in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel

Measurement	Equality of Variance	
Sustainability Score	F^1	p
	1.441	0.234
Use of Natural Resources	F^1	p
	2.380	.128
View of Modern Agriculture	F^1	p
	1.189	.280
Automation of Agriculture	F^1	p
	.128	.722
Size and Scale of Production	F^1	p
	3.310	.074
Agriculture in the Community	F^1	p
	.019	.892
View of the Successful Grower	F^1	p
	.002	.966
Diversity in Agriculture	F^1	p
	.345	.559

Note. [1]Levene's statistic – test of homogeneity of variance.

Independent t-tests were used to compare men's and women's Sustainability Scores as well as mean scores for the seven individual factors. As reported in Table 16, men (m=77.44) and women (m=82.88) did not differ in their overall Sustainability Scores (t= 1.74 , p= 0.087). However, women differed from men significantly on the Size and Scale of Production factor. Men (m=2.89) held a more conventional viewpoint than women (m=3.31) on this construct (t=2.101, p= 0.040). Further, the effect size, as measured by Cohen's d, was .529, which is interpreted as a medium effect (Cohen, 1988). The effect size is independent of sample size and can thus be utilized to communicate the magnitude of this relationship or compare findings between different populations.

Levene's statistic was calculated to determine homogeneity of variances between educational groups on Sustainability Score as well as individual construct scores. The results of this test were statistically significant ($F_{Levene's}$= 3.77, df= 2,65, p= 0.028) on Sustainability Score alone, indicating that variances between educational groups were different from one another. The results of this test were not statistically significant for: Use of Natural Resources Score ($F_{Levene's}$= 2.220, df= 2,65, p= .117), View of Modern Agriculture Score ($F_{Levene's}$= .797, df= 2,65, p= .455), Automation of Agriculture Score ($F_{Levene's}$= .350, df= 2,65, p= .706), Size and Scale of Production Score ($F_{Levene's}$= .754, df= 2,65, p= .475), Agriculture in the Community Score ($F_{Levene's}$= .799, df= 2,65, p= .454), View of the Successful Grower Score ($F_{Levene's}$= .610, df= 2,65, p= .547), or Diversity in Agriculture Score ($F_{Levene's}$= 1.304, df= 2,65, p= .278). The results of this test are displayed in Table 22.

Table 16
Independent t-test Comparing Men and Women on Sustainability Score in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variances)

Sustainability Score	**Men**	**Women**	**df**	**t**	**p**	
	77.44	82.88	63	1.74	.087	
	(14.97)	(10.23)				
Size and Scale of Production	**Men**	**Women**	**df**	**t**	**p**	**d**
	2.89	3.31	63	2.10	.040	.529
	(.93)	(.66)				
Use of Natural Resources	**Men**	**Women**	**df**	**t**	**p**	
	3.52	3.85	63	1.80	.077	
	(.86)	(.63)				
View of Modern Agriculture[a]	**Men**	**Women**	**df**	**t**	**p**	
	2.56	2.85	63	1.843	.070	
	(.61)	(.62)				
Automation of Agriculture	**Men**	**Women**	**df**	**t**	**p**	
	3.03	3.14	63	.528	.599	
	(.96)	(.78)				
Agriculture in the Community[a]	**Men**	**Women**	**df**	**t**	**p**	
	3.68	3.68	63	.03	.979	
	(.75)	(.72)				
View of the Successful Grower	**Men**	**Women**	**df**	**t**	**p**	
	2.92	3.18	63	1.13	.264	
	(.93)	(.86)				
Diversity in Agriculture	**Men**	**Women**	**df**	**t**	**p**	
	3.58	3.40	63	.916	.363	
	(.67)	(.83)				

Note. Standard Deviations appear in parentheses below means. Cohen's d value greater than .50 and less than .80 indicates a medium effect size (Cohen, 1988).
[a]View of Modern Agriculture and Agriculture in the Community factors were found to have extremely low reliability. The reader should be cautioned in interpreting results as they relate to factor analysis based on the small sample size available and the low reliability on two of the constructs.

The identified unequal variances were a violation of assumptions for ANOVA, and therefore the researcher used the Browne-Forsythe F test (FBF) for correction of calculation of the F-value. The results were non-significant (FBF(2, 65) = .53, p=0 .670), indicating that Sustainability Score means among the three groups (master's degree, bachelor's degree, and doctoral degree) were not significant. The results of this test are presented in Table 23. A one-way analysis of variance indicated that highest level of education attained had no affect on the mean score on any of the seven factors. These results are reported in Tables 23 through 30.

Levene's statistic was calculated to determine homogeneity of variances between groups based on whether they had attended a land-grant institution. The results of this test were not statistically significant for: Sustainability Score ($F_{Levene's}$= .798, df= 65, p= 0.375), Use of Natural Resources Score ($F_{Levene's}$= .101, df= 2,65, p= .752), View of Modern Agriculture Score ($F_{Levene's}$= .004, df= 2,65, p= .950), Automation of Agriculture Score ($F_{Levene's}$= .179, df= 2,65, p= .673), Agriculture in the Community Score ($F_{Levene's}$= .015, df= 2,65, p= .904), Size and Scale of Production Score ($F_{Levene's}$= 3.765, df= 2,65, p= .057), View of the Successful Grower Score ($F_{Levene's}$= .295, df= 2,65, p= .585), or Diversity in Agriculture Score ($F_{Levene's}$= 1.133, df= 2,65, p= .291), and therefore variances between groups were determined to not be different from one another. The results of this test are displayed in Table 31.

There was no significant difference in Sustainability Scores between faculty who had attended a land-grant university (m=80.12) and those who had not (m=85.78) based an independent t-test (t= 1.235, p= 0.221). Further, independent t-tests revealed that those who had attended a land-grant university did not respond differently on any on the seven factors. These results are displayed in Table 32.

Levene's statistic was calculated to determine homogeneity of variances between Florida Extension Districts. The results of this test were not statistically significant for: Sustainability Score ($F_{Levene's}$= 1.132, df= 4,62, p= 0.350), Use of Natural Resources Score ($F_{Levene's}$= .791, df= 2,65, p= .536), View of Modern Agriculture Score ($F_{Levene's}$= .611, df= 2,65, p= .657), Automation of Agriculture Score ($F_{Levene's}$= 1.174, df= 2,65, p= .331), Size and Scale of Production Score ($F_{Levene's}$= .445, df= 2,65, p= .775), Agriculture in the Community Score ($F_{Levene's}$= .508, df= 2,65, p= .730), View of the Successful Grower Score ($F_{Levene's}$= 1.985, df= 2,65, p= .108), or Diversity in Agriculture Score ($F_{Levene's}$= 2.077, df= 2,65, p= .095) and therefore variances between District groups were determined to not be different from one another. The results of this test are displayed in Table 33.

A one-way analysis of variance test was conducted to determine the effects of State District on scores. As reported in Table 34, this test revealed that location in the state did not have a significant effect on Sustainability Score (F= 1.53 , p= 0.204) or on any of the individual constructs (Tables 35 – 41).

A Pearson product-moment correlation coefficient was computed to assess the relationship between age and Sustainability Score. There was no correlation between the two variables (r = 0.188, n =60, p = .151). A Pearson product-moment correlation coefficient test also indicated that there was also no correlation between age and any of the seven factors: Use of Natural Resources (r = 0.168, n =60, p = .199), View of

Modern Agriculture ($r = 0.07$, $n = 60$, $p = 0.595$)., Automation of Agriculture ($r = 0.09$, $n = 60$, $p = .487$), Size and Scale of Production ($r = 0.148$, $n = 60$, $p = .259$), Agriculture in the Community ($r = 0.199$, $n = 60$, $p = .127$), View of the Successful Grower ($r = -0.41$, $n = 60$, $p = .758$), and Diversity in Agriculture ($r = 0.149$, $n = 60$, $p = .256$). These results are reported in Table 42.

Levene's statistic was calculated to determine homogeneity of variances between groups based on whether they had farm backgrounds. The results of this test were not statistically significant for: Sustainability Score ($F_{Levene's}= .112$, df=65, $p= 0.434$), Use of Natural Resources Score ($F_{Levene's}= .007$, df= 2,65, $p= .933$), View of Modern Agriculture Score ($F_{Levene's}= .790$, df= 2,65, $p= .377$), Automation of Agriculture Score ($F_{Levene's}= 3.579$, df= 2,65, $p= .063$), Size and Scale of Production Score ($F_{Levene's}= .976$, df= 2,65, $p= .327$), Agriculture in the Community Score ($F_{Levene's}= 2.869$, df= 2,65, $p= .095$), View of the Successful Grower Score ($F_{Levene's}= 3.995$, df= 2,65, $p= .050$), or Diversity in Agriculture Score ($F_{Levene's}= .694$, df= 2,65, $p= .408$). Therefore, it was determined that variances between farm background groups were not statistically significant from one another. The results of this test are displayed in Table 43.

An independent t-test indicated that there was no difference in Sustainability Score means for faculty based on whether they considered their upbringing to be farm ($m=78.85$) or non-farm ($m=81.55$), ($t= 0.786$, $p= 0.434$). An independent t-test also indicated that there was no difference in mean construct score for any of the seven factors: Use of Natural Resources ($t= 1.256$, $p=0.214$), View of Modern Agriculture ($t= 1.684$, $p=0.097$)., Automation of Agriculture ($t=1.462$, $p=.149$), Size and Scale of

Production (t=.584, p=.561), Agriculture in the Community (t=1.073, p=.187), View of the Successful Grower (t=.807, p=.423), and Diversity in Agriculture (t=1.078, p=.285). This results are displayed in Table 44.

Levene's statistic was calculated to determine homogeneity of variances between groups based on agricultural land ownership. The results of this test were not statistically significant for: Sustainability Score ($F_{Levene's}$=1.365, df=65, p= 0.247), Use of Natural Resources Score ($F_{Levene's}$= 1.036, df= 2,65, p= .313), View of Modern Agriculture Score ($F_{Levene's}$= .366, df= 2,65, p= .547), Automation of Agriculture Score ($F_{Levene's}$= 1.252, df= 2,65, p= .267), Agriculture in the Community Score ($F_{Levene's}$= .012, df= 2,65, p= .913), Size and Scale of Production Score ($F_{Levene's}$= 1.724, df= 2,65, p= .194), View of the Successful Grower Score ($F_{Levene's}$= .409, df= 2,65, p= .525), or Diversity in Agriculture Score ($F_{Levene's}$= 1.029, df= 2,65, p= .314). Therefore, it was determined that variances between land owner groups were not statistically significant from one another. The results of this test are displayed in Table 45.

An independent t-test indicated that there was no difference in Sustainability Score means for faculty based on whether they owned agricultural land (m=81.00) or not (m=80.42), (t= 0.183, p= 0.895). As displayed in Table 46, an independent t-test also indicated that there was no difference in mean construct score for any of the seven factors: Use of Natural Resources (t= .671, p=0.540), View of Modern Agriculture (t= .635, p=0.528), Automation of Agriculture (t=.058, p=.954), Size and Scale of Production (t=.761, p=.450), Agriculture in the Community (t=.261, p=.795), View of the Successful Grower (t=.464, p=.644), and Diversity in Agriculture (t=.821, p=.414).

Levene's statistic was calculated to determine homogeneity of variances between disciplinary groups. The results of this test were not statistically significant on: Sustainability Score ($F_{Levene's}$=1.259, df=2,65, p= 0.295), Use of Natural Resources Score ($F_{Levene's}$= 1.403, df= 2,65, p= .243), View of Modern Agriculture Score ($F_{Levene's}$= 1.334, df= 2,65, p= .267), Automation of Agriculture Score ($F_{Levene's}$= .714, df= 2,65, p= .585), Size and Scale of Production Score ($F_{Levene's}$= 2.090, df= 2,65, p= .093), View of the Successful Grower Score ($F_{Levene's}$= 1.733, df= 2,65, p= .154), or Diversity in Agriculture Score ($F_{Levene's}$= .119, df= 2,65, p= .975). Therefore, it was determined that variances between disciplinary groups were not statistically significant from one another on these measures. Levene's statistic indicated a difference in variance on the Agriculture in the Community Score ($F_{Levene's}$= 3.158, df= 2,65, p= .020) variable. The results of this test are displayed in Table 17.

Table 17
Variance Between Disciplinary Group in Sustainability Score in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel

Measurement	Equality of Variance	
Sustainability Score	F[1]	p
	1.259	.295
Use of Natural Resources	F[1]	p
	1.403	.243
View of Modern Agriculture	F[1]	p
	1.334	.267
Automation of Agriculture	F[1]	p
	.714	.585
Size and Scale of Production	F[1]	p
	2.090	.093
Agriculture in the Community	F[1]	p
	3.158	.020
View of the Successful Grower	F[1]	p
	1.733	.154
Diversity in Agriculture	F[1]	p
	.119	.975

Note. [1]Levene's statistic – test of homogeneity of variance.

A one-way analysis of variance was used to examine differences between Sustainability Scores and mean construct scores based on faculty's area of discipline. These results are presented in Tables 47 through 53. There was no difference in Sustainability Score means between disciplines (F= 1.49 , p= 0.217). There was also no difference between disciplinary groups on six of the seven constructs: View of Modern Agriculture (F= 1.092, p=0.368), Automation of Agriculture (F=.665, p=.619), Size and Scale of Production (F=1.264, p=.294), View of the Successful Grower (F=.971, p=.430), and Diversity in Agriculture (F=.898, p=.471). Due to the fact that a difference between variances was identified between groups for Agriculture in the Community Score, a Brown-Forsythe F-test was used for correction to the calculation of the F-value. There were no significant difference between disciplinary groups on the Agriculture in the Community Score ($F_{FB}(4, 63) = .082$, p=0 .990).

As reported in Table 18, a difference between disciplinary groups was indentified between group means on the Use of Natural Resources factor (F=3.22, p=0.018). Post-hoc comparisons using Tukey's HSD indicated that Extension faculty working in Agriculture (m=3.25) scored significantly more conventionally than did those in Family and Consumer Sciences (m=4.03, p=.033) and Horticulture (m=3.88, p=.040). Cohen's f, a measure of the magnitude of relationship, was measured at .453, which was interpreted as a large effect size (Cohen, 1988).

Table 18
Analysis of Variance Comparing Extension Professionals' Use of Natural Resources Score by Discipline in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variance)

Univariate Statistics		**N**	**Mean Natural Resources Score**	**Standard Deviation**			
	4-H	11	3.80	.42			
	Agriculture	19	3.25[a]	.82			
	Horticulture	22	3.88[b]	.75			
	Family and Consumer Sciences	11	4.03[b]	.60			
	Other	5	3.98	.53			
	Totals	68					
Multivariate Statistics		**df**	**SS**	**MS**	**F**	**p**	**Cohen's f**
	Between	4	6.24	1.56	3.22	0.018	.453
	Within	63	30.48	.48			
	Total	67	36.71				

Note. Cohen's f value of greater than 0.40 indicates a large effect size (Cohen, 1988). Means with differing superscripts are significantly different at p < .05 with respect to Tukey's post hoc analyses.

Conclusions and Discussion

An understanding of individual paradigms encompassed by an Extension organization can facilitate the development of educational initiatives and policies. The findings of this study can be generalized to the population, as indicated by a comparison between early and late respondents. It is anticipated that this research supports future development of in-service training, educational programming, and organizational policy- and goal- setting.

A preliminary factor analysis solution was identified by this study. The responding sample was significantly smaller than would be desirable for this analysis. Of the seven emerging constructs, two factors: View of Modern Agriculture and Agriculture in the Community, were found to have extremely low reliability. The reader should be cautioned in interpreting results as they relate to factor analysis in relation to the small sample size available and the low reliability on two of the constructs.

Previously, women have been found to adhere to a more sustainable paradigm than men (Beus & Dunlap, 1992). However, this study found that gender did not affect overall Sustainability Scores, or on most factors, but women scored less conventionally than men on the Size and Scale of Production construct. The Size and Scale of Production construct included items that address meeting food needs with fewer farmers as positive versus negative, producing food at local versus national levels, and less diverse, larger operations versus diverse, smaller operations best meeting agricultural needs. Women faculty members within University of Florida Extension prefer a paradigm where: a) meeting food needs with fewer farmers is seen as a negative trend; b) production, packaging, and marketing of food should take place at the local and regional level; and c) more diverse, smaller operations meet agricultural needs best. This finding suggested that women may be well-suited for roles in facilitating local and community agricultural endeavors.

The highest level of education attained by a faculty member had no relation to their Sustainability Scores or individual construct scores. More education did not equate to a changed perception towards agriculture in either direction on the alternative-conventional continuum. Sustainability Scores and factor scores were also not affected by whether one attended a land-grant university. This result was contrary to previous findings that land-grant university-educated individuals were more likely to endorse a conventional agricultural paradigm (Beus & Dunlap, 1992). The data confirms that land-grant universities are no longer associated with producing individuals who adhere towards a more conventional paradigm than their non-land-grant educated counterparts.

The State Extension District did not affect the Sustainability Score or factor variables. Similar to Jayaratne et al.'s (2001) findings, neither farm background nor agricultural land ownership affected Sustainability Scores or individual construct scores. This finding disputes previous data, which suggested that those raised on farms are more likely to align with a conventional paradigm (Beus & Dunlap, 1992).

Similar to the findings of Jayaratne et al (2001), age was not correlated with overall Sustainability Score or individual construct scores. Based on this data, the researcher disputes Beus and Dunlap's previous assertions that younger faculty members tend to endorse a more sustainable agricultural paradigm (1992). This researcher suggested that agricultural sustainability is no longer a new concept; it has endured for decades, and is no longer seen as a passing trend. The lack of relationship between age and agricultural paradigm supports this assertion. The Extension community in Florida has embraced agricultural sustainability, and, as in the words of Lowe, "future generations will thank us for having thought ahead" (2007, p. 19).

Area of discipline was not related to overall Sustainability Scores, but it was related to one individual factor score between three areas of discipline with a large magnitude of relationship. Agriculture faculty scored significantly less sustainably than both family and consumer sciences and horticulture faculty within the Use of Natural Resources factor. Within this factor, agricultural faculty members indicated that agricultural success is related to overcoming nature, managing cropland for profits, using soil and water as needed, and using primarily synthetic fertilizers. The Cohen's f measure of effect size for this analysis was .453, indicating a strong magnitude of relationship between discipline and Use of Natural Resources Score. Both family and consumer sciences and horticulture faculty indicated preference for strict conservation of soil and water, using primarily natural inputs and production methods, and identified agricultural success in terms of harmonizing with nature. This finding reinforces Beus and Dunlap's (1992) data, where Washington State faculty members associated with Agriculture were found to be significantly more conventional in their paradigms than those affiliated with social-science departments, including 4-H and consumer sciences. They found production-oriented faculty to score less sustainably than their non-production-oriented counterparts (Beus & Dunlap, 1992). The sustainable agricultural preference of horticulture and family and consumer sciences agents suggested that non-agricultural faculty may play a key role in facilitating the adoption of this paradigm.

There are few relationships between age, gender, discipline, farm background, and previous attendance of a land-grant university, which is aligned with the findings of Jayaratne et al (2001) in a study on north-central Unites States Extension educators. These results confirm that sustainable and conventional agriculture are not mutually exclusive as once previously thought. The lack of dependent variables' relationship with

Sustainability Scores may be an indication that the University of Florida Extension Faculty share more commonality than may have been anticipated. This is a positive reinforcement that faculty do collectively support the goals and objectives of the organization they represent.

The University of Florida Extension faculty has exhibited a strong pro-sustainability stance. The University offers an organic and sustainable agriculture curriculum to students (Ferguson et al., 2006); and it has indicated that sustainable use of environmental resources in agriculture and food systems is a priority for educational programming as part of its Statewide Goal and Focus Areas (2008). The University was named as one of the top six schools in the United States to facilitate learning and research about organic agriculture (OFRF, 2012). Many visible signs indicate the University's commitment to facilitating sustainable agriculture in Florida. Prior to this study, it was not known where the individual Extension faculty members stood paradigmatically, but it was known that individuals within an organization do not necessarily subscribe to the same objectives and that individual actions play a critical role in an organization's overall behavior (Eveland, 1986; Minarovic & Mueller, 2000).

Agunga and Igodan (2007) identified the paradox in which sustainable agriculture producers greatly needed Extension, but only used this service as a secondary source of information, due to the fact that they view Extension as lacking in knowledge about sustainable agriculture. Menalled et al. (2009) emphasized the importance of developing sustainable agricultural in-service training programs based on the audience's known perceptions. This study identified that the paradigmatic preferences of nearly all

Florida Extension faculty are strongly aligned with the Sustainables group, or the Moderates group, who accept both conventional and sustainable agricultural practices. It is now known how the University of Florida Extension faculty feel about agriculture, and it is suggested that the attitudes of these change agents is not one of the many barriers to sustainable agricultural practices (Rodriguez et al., 2009).

With the audience's collective and individual paradigmatic preferences now documented, it is suggested that administration will be prepared to develop in-service training programs to better equip their Extension faculty to teach about sustainable agricultural practices. More resources and training should be directed towards this area, as the University of Florida Faculty's agricultural paradigms indicate that they are ready to embrace sustainable agriculture and facilitate this critical shift.

SUMMARY, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Summary

Sustainable agriculture is inseparable from emerging policies and organizational goals at all levels: local, institutional, and national. Cooperative Extension services and their agents nationwide are key providers of agricultural information and have been tasked with facilitating the shift to accommodate more sustainable agricultural practices. However, very little is known about Extension agents' feelings towards sustainable agriculture. Specifically, very little, if any, research has been conducted to measure University of Florida Extension faculty's agricultural paradigms. There was no documentation on whether the Extension faculty supported their organization in this goal or not. This study sought to fill the gap in the body of research on this topic.

An existing ACAP instrument was modified and modernized. Double-barreled statements were identified and removed, and language was modernized and broadened to appeal to a more diverse audience. Pilot study data indicated that the updated instrument was reliable and valid, and useful in effectively, quantitatively measuring individuals' agricultural paradigms. No adjustments to the instrument were determined to be necessary as a result of the pilot study, and it was determined that this tool could be used to accurately collect data on populations of Extension agents and other educators.

The modernized ACAP scale was administered to a random sample of University of Florida Extension faculty. The faculty's mean Sustainability Score (80.64) emerged slightly above 72, the median value between the most conventional (24) and alternative

(120) potential scores. The majority of Florida Extension agents (65.2%) considered themselves supporters of both conventional and alternative agricultural practices. The findings suggest that nearly all (95.6%) of University of Florida Extension faculty members adhere to one of two paradigmatic groups that were labeled Sustainables and Moderates. Very few (4.4%) Florida Extension agents consider themselves to be Conventionals. Based upon the findings, it was determined that faculty are accepting of a sustainable agricultural paradigm, and prepared to facilitate teaching about sustainable agricultural practices when appropriate.

Exploratory Factor Analysis identified seven constructs that explained 68.1% of the variance. Cronbach's alpha was calculated to determine the reliability of the identified constructs. These constructs and their corresponding Cronbach's alpha values are as follows: a) Use of Natural Resources (.852); b) View of Modern Agriculture (.436); c) Automation of Agriculture (.657); d) Size and Scale of Production (.652); e) Agriculture in the Community (.213); f) View of the Successful Grower (.547); and g) Diversity in Agriculture (.581). The reader should be cautioned in interpreting the results based on low level of reliability for two of the constructs. The sample used for this factor analysis (n=69) exceeds those used in other accurate factor analyses (Winter et al., 2009). It is suggested that the seven constructs identified in this study are valid, given previous findings that there is no absolute minimum size when communalities are strong (Hogarty, Hines, Kromrey, Ferron & Mumford, 2005; MacCallum et al., 2001). It is also suggested that the solution offered by this exploratory factor analysis is preliminary, and should be replicated with a larger sample size to determine if this instrument identifies the same constructs or more reliable constructs within larger populations.

There were minimal relationships between overall agricultural paradigms as a function of age, Florida Extension District, gender, discipline, agricultural land ownership, farm background, and previous attendance of a land-grant university. There were some statistically significant differences on individual constructs based on gender and discipline.

The Sustainables scored higher, or more sustainably, than did the Moderates, on three constructs: a) Use of Natural Resources; b) View of Modern Agriculture; and c) View of the Successful Grower. This data validated the differences between paradigms on factors that relate to the use and domination of natural resources, as well as how a successful production operation should be managed.

Gender did not affect overall Sustainability Scores, or scores for most factors, but women scored less conventionally than men on the Size and Scale of Production construct. This data supported previous findings that women adhere to a more sustainable paradigm than men (Beus & Dunlap, 1992). This finding suggested that women may be well-suited for roles in facilitating local and community agricultural endeavors.

Sustainability Scores and individual construct scores were not affected by the level of education attained by a faculty member. Sustainability Scores and factor scores were also not affected by whether one attended a land-grant university. This result was contrary to previous findings that land-grant university-educated individuals are more conventional (Beus & Dunlap, 1992). It was suggested that land-grant universities are no longer associated with producing individuals who adhere towards a more conventional paradigm than their non-land-grant educated counterparts.

Neither farm background nor current agricultural land ownership affected Sustainability Scores or individual construct scores, which aligned with the findings of Jayaratne et al. (2001). This data disputes Beus and Dunlap's finding (1992) that those raised on farms are more likely to align with a conventional paradigm. State Extension District also did not affect the Sustainability Score or factor variables.

This study determined that age was not correlated with Florida Extension faculty's overall Sustainability Score or individual construct scores, which aligned with the findings of Jayaratne et al. (2001). The researcher disputes Beus and Dunlap's previous assertions that younger faculty members align with a more sustainable agricultural paradigm (1992). Based upon the lack of relationship between age and agricultural paradigm, the researcher suggests that agricultural sustainability is not a new and passing trend, but is a permanent and well-accepted paradigm.

Area of discipline was not related to overall Sustainability Scores, but it was related to one individual factor score between three areas of discipline. Agriculture faculty scored significantly less sustainably than both family and consumer sciences and horticulture faculty within the Use of Natural Resources factor. This finding reinforced Beus and Dunlap's (1992) data, where agricultural faculty members were found to be significantly more conventional in their paradigms than those affiliated with social-science departments, including 4-H and Consumer Sciences.

Conclusions and Implications

The University of Florida exhibits a commitment to achieving agricultural sustainability, through its offering of organic and sustainable agriculture curriculum to students (Ferguson et al., 2006) and priorities in educational programming set forth in its Statewide Goal and Focus Areas (2008). The University was also identified as one of the top six schools in the United States to facilitate learning and research about organic agriculture (OFRF, 2012). These visible signs indicate the University's commitment to sustainable agriculture. However, prior to this study, it was not known where the individual Extension faculty members stood paradigmatically. This was considered an important area to explore, given the likelihood that individual views might not reflect the overall goals of the organization (Minarovic & Mueller, 2000).

This study identified that the paradigmatic preferences of nearly all Florida Extension faculty are strongly aligned with either a Moderates group, who accept both conventional and sustainable agricultural practices, or a Sustainables group, who strongly support sustainable agricultural practices. It is now known how the University of Florida Extension faculty feel towards agricultural paradigms, and it is suggested that the attitudes of these change agents is not one of the many barriers to sustainable agricultural practices (Rodriguez et al., 2009).

Land-grant universities have been criticized for not focusing more centrally on sustainable development (Rodriguez, et al., 2009). However, the findings from this study indicated that land-grant-university- educated faculty scored no differently than their counterparts who did not attend land-grant schools. This data indicates that land-grant universities may be fully embracing the movement towards sustainable agriculture and producing more alternatively-oriented individuals than they had historically.

Extension faculty have indicated substantial needs for training in sustainable agricultural practices (Agunga, 1995). However, it is known that the identification of a population's perceptions have been identified as a critical first step in developing these educational training programs (Menalled et al., 2009). A primary goal of this study was to measure individual paradigmatic preferences, under the theoretical framework that individual values do not necessarily reflect the objectives set by their organization (Minarovic & Mueller, 2000). This study documented that the paradigmatic preferences of nearly all Florida Extension faculty are strongly aligned with the Moderates group, accepting of both conventional and sustainable agricultural practices, and the Sustainables group, supportive of sustainable agriculture. This was a critical step in developing a framework to support better in-service training programs for this audience. Further, this research confirmed that the individuals that make up University of Florida Extension do align with the organization's core goal of sustainability in agricultural production and natural resource use. It is anticipated that this research will support the development of in-service training, educational programming, and organizational policy- and goal- setting.

With the audience's collective and individual paradigmatic preferences now documented, it is suggested that administration will be prepared to develop in-service training programs to better equip their Extension faculty to teach about sustainable agricultural practices. More resources, teaching tools, and training should be directed towards this area, as the University of Florida Faculty's agricultural paradigms indicate that they are ready to embrace sustainable agriculture and facilitate this critical shift.

Recommendations for Research

Several studies have indicated that significant research was necessary to understand paradigmatic views of agriculture (Allen & Bernhardt, 1995; Beus & Dunlap, 1991; Beus & Dunlap, 1992; Beus & Dunlap, 1994). While the current research supports an understanding of University of Florida Extension faculty's paradigmatic preferences, it is suggested that further research be conducted to build on the findings of this study. The researcher suggests that this study be replicated over time to document any trends toward or against a stronger sustainable agricultural paradigm. Further, the researcher suggests that qualitative studies of Florida Extension agents follow this research. Extension faculty should be asked specifically whether they are adopting sustainable agriculture in their teaching. They should also be given the opportunity to share their perceptions of in-service training needs and barriers to their adoption of sustainable agriculture. This data can be compared and contrasted with previously identified barriers to adoption of sustainable agriculture within the Extension system (Agunga & Igodan, 2007; Hanson et al., 1995; Rodriguez et al., 2009) and faculty's numerous in-service training needs on this topic (Agunga, 1995). It is recommended that further research be conducted to explore the effect of gender and discipline on agricultural paradigm, specifically within the constructs where differences were identified based on these characteristics. Finally, it is recommended that research be conducted to explore methods that Florida Extension agents can use to disseminate information about sustainable agricultural practices. Appropriate methods of disseminating information to producers and consumers should be explored and evaluated.

The researcher suggests that further studies utilizing this modernized ACAP scale be conducted outside of the University of Florida. Other states' Cooperative Extension services should be studied, with a goal of measuring the individual paradigms that make up each state's and the National Cooperative Extension Service as a whole. Resulting data may indicate whether there is a national trend towards the sustainable paradigm or if University of Florida faculty are different from others throughout the nation. Other organizations that support agricultural producers and sustainable agricultural education, may find the modernized ACAP scale valuable to better understanding their constituents. A comparison between agricultural professionals in other countries, using the modernized ACAP scale, would also be beneficial to understanding perspectives and preferences on a global scale.

This study identified seven constructs as a solution to a preliminary factor analysis. This analysis should be replicated on the current data set as well as with a larger sample to further explore and validate the identified constructs. Two of the preliminary factors were identified as having low reliability as measured by Cronbach's alpha coefficient. This finding suggests that a more appropriate solution for this study would consist of fewer than seven constructs, indicating a need for significant work in this area.

Recommendations for Practice

This research lays a strong foundation for understanding the University of Florida Cooperative Extension agent population. Society is demanding a more sustainable agriculture and organizations, including governmental agencies, and universities such as the University of Florida, are adopting sustainability in their goals and objectives. Extension faculty in land-grant universities have been identified as potential facilitators for the transition to a more sustainable agriculture for growers and other members of the community. This study revealed that all University of Florida Extension faculty are strongly aligned with two agricultural paradigms labelled Sustainables and Moderates, meaning that they are well-poised to learn and teach about sustainable agriculture as this paradigm becomes more and more critical to the health of our environment and communities.

A number of recommendations for practice can be made based on the findings of this study. Abaidoo and Dickinson asserted that an understanding of agricultural paradigms was a critical "precondition for developing effective educational and policy responses to environmental concerns, including concerns related to farming practices" (2002, p. 116). Menalled et al. (2009) emphasized the importance of developing sustainable agricultural in-service training programs based on the audience's known perceptions. Now that individual paradigms held by the University of Florida Extension faculty are documented, administration should feel confident that their constituents are aligned with their core values and objectives and should move forward in developing training programs for their Extension faculty. The Extension agent population should be provided with further educational tools and training related to sustainable agricultural practices so that their teachings on this topic may be enhanced.

This study identified support for sustainable agriculture expressed by non-agricultural faculty. This finding indicates that these faculty may play a role in the teaching and facilitation of sustainable agricultural practices, perhaps as members of interdisciplinary Extension teams.

Agunga and Igodan (2007) identified the paradox in which sustainable agriculture producers greatly need Extension, but only use this service as a secondary source of information, due to the fact that they view Extension as lacking in knowledge about sustainable agriculture. This study suggested that this paradox can change, and perhaps is already changing. It is suggested that University of Florida faculty are prepared, and should step forward from their previous role as secondary sources of information about sustainable agriculture to primary facilitators of this paradigm. The discovery of the University of Florida Extension faculty's perceptions is an indication that they are prepared to carry out this task.

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APPENDIX A

LETTER OF INFORMED CONSENT

Letter of Informed Consent

Dear University of Florida IFAS Extension Faculty member,

Survey research is being conducted to study UF Extension faculty members' perceptions towards agriculture and your assistance is requested in completing the following survey. Your answers to this survey will directly support our understanding of the University of Florida's Extension faculty. The results will be shared with our Extension staff and with others interested in our profession. The survey should take about 10-15 minutes to complete. This study has the support of your district Extension director.

There are no known risks to participants of this study, and no compensation is provided for participation. All participants will be entered in a drawing for a gift card as an incentive to participate. Two $25 gift cards will be awarded. Indirect benefits of participating include contributing to knowledge about perceptions of sustainable and conventional agriculture and the potential to win a gift card should your name be selected in the random drawing. Your answers and identity will remain confidential to the extent provided by law. Your participation is completely voluntary; you are not required to answer any question that you do not wish to answer, and you have the right to stop your participation at any time without penalty. Simply close your browser window to withdraw from the survey. To participate in this study, please follow this link: (*web link included here).* Please see the attached information sheet for further information about this study and your rights as a research participant.

Thank you,

Theresa Murphrey and Laura Sanagorski

This research study has been reviewed by the Human Subjects' Protection Program and/or the Institutional Review Board at Texas A&M University. For research-related problems or questions regarding your rights as a research participant, you can contact these offices at (979)458-4067 or irb@tamu.edu.

APPENDIX B

SURVEY INSTRUMENT: MODERN ACAP SCALE SURVEY INSTRUMENT qualtrics.com

Listed below are several *pairs of contrasting views* regarding agriculture in the United States. For each pair indicate *which one of the two views you agree with most*– the one in the left-hand column or the one in the right-hand column – by clicking the appropriate radio button on the line between them. The radio button in the middle indicates that you are neutral or undecided, while the radio button on either end indicates strong agreement with the statement nearest your selection.

1= STRONGLY AGREE WITH VIEW IN LEFT-HAND COLUMN
2= MILDLY AGREE WITH VIEW IN LEFT-HAND COLUMN
3= NEUTRAL / UNDECIDED
4= MILDLY AGREE WITH VIEW IN RIGHT-HAND COLUMN
5= STRONGLY AGREE WITH VIEW IN RIGHT-HAND COLUMN

******************** Please choose *one selection only* for each item********************

	1	2	3	4	5	
A. Meeting American food needs with fewer farmers is a POSITIVE outcome of agricultural technology.	○	○	○	○	○	Meeting American food needs with fewer farmers is a NEGATIVE outcome of agricultural technology.
B. Cropland should be managed to protect the long-term PRODUCTIVE CAPACITY of the land regardless of result on production and profits.	○	○	○	○	○	Cropland should be managed to maximize ANNUAL PROFITS, even if this threatens the long-term productive capacity of the land.
C. Dependence on high inputs of energy makes U.S. agriculture VULNERABLE	○	○	○	○	○	Dependence on high inputs of energy makes U.S. agriculture SECURE.
D. The primary goal of agriculturists should be to maximize the PROFITABILITY of their land at any cost.	○	○	○	○	○	The primary goal of agriculturists should be to enhance the LONG-TERM CONDITION of their land at any cost.
E. The amount of agricultural land owned by an individual SHOULD NOT be limited.	○	○	○	○	○	The amount of agricultural land owned by an individual SHOULD be limited.
F. Scientists and policy-makers should recognize that there are limits to food production.	○	○	○	○	○	Scientists and policy-makers should develop technologies and other innovations in order to increase food supplies.
G. Successful agriculture depends mainly on PERSONAL EXPERIENCE and LOCAL KNOWLEDGE of the land.	○	○	○	○	○	Successful agriculture depends mainly on applying the findings of MODERN agricultural SCIENCE and TECHNOLOGY.
H. The future success of American agriculture WILL NOT be affected if small communities continue to decline.	○	○	○	○	○	The future success of American agriculture WILL be affected if small communities continue to decline.
I. DIVERSE, SMALLER-sized operations can best serve American agricultural needs.	○	○	○	○	○	LESS DIVERSE, LARGER-sized operations can best serve American agricultural needs.
J. Farm traditions and culture are OUTDATED and of little use in modern agriculture.	○	○	○	○	○	Farm traditions and culture are ESSENTIAL for modern agriculture.
K. Farming is a business like any other.	○	○	○	○	○	Farming is a way of life first and a business second.
L. Growers should primarily use NATURAL fertilizers and production methods such as crop rotations and integrated pest management.	○	○	○	○	○	Growers should primarily use SYNTHETIC fertilizers and pesticides.
M. LESS people should participate in food production than do so at present.	○	○	○	○	○	MORE people should participate in food production than do so at present.
N. Modern agriculture is a cause of MAJOR environmental problems.	○	○	○	○	○	Modern agriculture causes MINOR environmental problems.
O. Landowners should farm only as much land as they can personally manage.	○	○	○	○	○	Landowners should farm as much land as they can profitably.
P. Agricultural operations should specialize in one, or at most, a few crops.	○	○	○	○	○	Agricultural operations should be diversified and include a large variety of crops.
Q. Soil and water should be STRICTLY CONSERVED.	○	○	○	○	○	Soil and water should be USED AS NEEDED to maximize production.
R. Growers should purchase most of their goods and services.	○	○	○	○	○	Growers should produce as many of their own goods and services as possible.
S. The key to agriculture's future success lies in production methods that are in harmony with nature.	○	○	○	○	○	The key to agriculture's future success lies in technologies that will overcome nature's limits.
T. Producers should specialize in EITHER crops or livestock.	○	○	○	○	○	Producers should include BOTH crops and livestock in their operations.
U. Production, processing, and marketing of food products should take place at LOCAL and REGIONAL levels.	○	○	○	○	○	Production, processing, and marketing of food products should take place at NATIONAL and INTERNATIONAL levels.
V. The successful grower is one who earns enough to enjoy an above average standard of living.	○	○	○	○	○	The successful grower is one who truly enjoys growing crops regardless of income.
W. Technology should be used to enhance agricultural labor, but not to replace it.	○	○	○	○	○	Agricultural labor should be replaced whenever possible by technologies.
X. The availability of food in the United States is evidence that agriculture IS VERY SUCCESSFUL	○	○	○	○	○	Environmental consequences of modern agriculture are evidence that United States agriculture IS NOT VERY SUCCESSFUL.

Would you describe yourself as:

- A strong supporter of sustainable agriculture practices
- A supporter of both sustainable and conventional practices
- A strong supporter of conventional agriculture practices
- None of the above

Please help us to describe University of Florida Extension Agents by telling us about yourself:

Name (Will be used to verify that duplicate surveys are not received, and also to enter your name in a drawing.)

Age

Gender

What is the highest level of education you have attained?

Did you attend a land-grant college?

If you attended a land-grant college, what degree was it for: (check all that apply)

- High School
- 2- Year Degree
- 4-Year Degree
- Master's Degree
- Doctorate
- Post-Doctorate
- Professional Degree (i.e. DVM)

Would you consider your upbringing / background:

Do you own land on which you produce agricultural products to sell?

If you answered yes to the above, how many acres do you own?

If you answered yes to the above, how many acres do you own?

In what district do you currently work:

In which discipline do you primarily work?

- 4-H
- Agriculture
- Horticulture
- Family/Consumer Sciences
- Other

If you answered "other" above, what discipline do you work in?

>>

Survey Powered By Qualtrics

APPENDIX C

REPLACEMENT SURVEY LETTER

Dear University of Florida IFAS Extension Faculty member,

Two weeks ago a request was sent to you asking for your help in completing a short survey about your perceptions towards agriculture. If you have not completed this questionnaire, we'd like to ask you to please take a few moments of your time to take this short survey. It should take no more than 10-15 minutes to complete.

All participants will be entered in a drawing for a gift card as an incentive to participate. Two $25 gift cards will be awarded. Please click on the link below to take this short survey.

Follow this link to the Survey: (*web link included here).*

Thank you kindly for your time.

Theresa Murphrey and Laura Sanagorski

APPENDIX D

SECOND REPLACEMENT SURVEY LETTER

Dear University of Florida IFAS Extension Faculty member,

Four weeks ago a request was sent to you asking for your help in completing a short survey about your perceptions towards agriculture. If you have not completed this questionnaire, we'd like to ask you to please take a few moments of your time to take this short survey. It should take no more than 10-15 minutes to complete.

All participants will be entered in a drawing for a gift card as an incentive to participate. Two $25 gift cards will be awarded. Please click on the link below to take this short survey.

Follow this link to the Survey: (*web link included here).*

Thank you kindly for your time.

Theresa Murphrey and Laura Sanagorski

APPENDIX E

ORIGINAL ALTERNATIVE CONVENTIONAL AGRICULTURAL PARADIGM

SURVEY INSTRUMENT

Original Alternative Conventional Agricultural Paradigm Survey Instrument

Please choose one selection only for each item		
A. Meeting U.S. food needs with fewer and fewer farmers is a positive outcome of technological process.	……... 1 2 3 4 5 …..…..	Meeting U.S. food needs with fewer and fewer farmers is a negative outcome of our free market system.
B. Farmland should be farmed so as to protect the long-term productive capacity of the land, even if this means lower production and profits.	……... 1 2 3 4 5 …..…..	Farmland should be farmed so as to maximize annual profits, even if this threatens the long-term productive capacity of the land.
C. High energy use makes U.S. agriculture vulnerable and should be greatly reduced.	……... 1 2 3 4 5 …..…..	Large inputs of energy into agriculture should be continued as long as it is profitable to do so.
D. The primary goal of farmers should be to maximize the productivity, efficiency, and profitability of their farms.	……... 1 2 3 4 5 …..…..	The primary goal of farmers should be to improve the quality of their products and to enhance the longterm condition of their farms.
E. The amount of farmland owned by an individual or corporation should NOT be limited, even if the ownership of land becomes much more concentrated than at present.	……... 1 2 3 4 5 …..…..	Meeting U.S. food needs with fewer and fewer farmers is a negative outcome of our free market system.
F. Agricultural scientists and policy-makers should recognize that there are limits to what nature can provide and adjust their expectations accordingly.	……... 1 2 3 4 5 …..…..	Agricultural scientists and policy-makers should expand efforts to develop biotechnologies and other innovations in order to increase food supplies.
G. Good farming depends mainly on personal experience and knowledge of the land.	……... 1 2 3 4 5 …..…..	Good farming depends mainly on applying the findings of modern agricultural science.
H. The future success of American agriculture will NOT be affected if rural communities continue to decline.	……... 1 2 3 4 5 …..…..	Healthy rural communities are absolutely essential for American agriculture's future success.
I. Small to medium-sized farms can best serve American agricultural needs.	……... 1 2 3 4 5 …..…..	Large to very large farms can best serve America's agricultural needs.
J. Farm traditions and culture are outdated and of little use in modern agriculture.	……... 1 2 3 4 5 …..…..	Farm traditions and culture help maintain respect for the land and are essential for good farming.
K. Farming is first and foremost a business like any other.	……... 1 2 3 4 5 …..…..	Farming is first of all a way of life and second a business.
L. Farmers should use primarily natural fertilizers and production methods such as manure, crop rotations, compost, and biological pest control.	……... 1 2 3 4 5 …..…..	Farmers should use primarily synthetic fertilizers and pesticides in order to maintain adequate levels of production.
M. Most people should live in cities and leave farming to those who do it best.	……... 1 2 3 4 5 …..…..	Many more people should live on farms and in rural areas than do so at present.
N. Modern agriculture is a major cause of ecological problems and must be greatly modified to become ecologically sound.	……... 1 2 3 4 5 …..…..	Modern agriculture is a minor cause of ecological problems and needs only be fine-tuned periodically in order to be ecologically sound.
O. Farmers should farm only as much land as they can care for.	……... 1 2 3 4 5 …..…..	Farmers should farm as much land as they profitably can.
P. Farms should be specialized in one or at most a few crops.	……... 1 2 3 4 5 …..…..	Farms should be diversified and include a large variety of crops.
Q. Soil and water are the sources of all life and should therefore be strictly conserved.	……... 1 2 3 4 5 …..…..	Soil and water are the basic factors of production and should be used so as to maximize production.
R. Farmers should purchase most of their goods and services just as other consumers do.	……... 1 2 3 4 5 …..…..	Farmers should produce as many of their own goods and services as possible.
S. The key to agriculture's future success lies in learning to imitate natural ecosystems and farm in harmony with nature.	……... 1 2 3 4 5 …..…..	The key to agriculture's future success lies in the continued development of advanced technologies that will overcome nature's limits.
T. Most farms should specialize in either crops or livestock.	……... 1 2 3 4 5 …..…..	Most farms should include both crops and livestock.

U. Production, processing, and marketing of agricultural products is best done at the local and regional levels.	……... 1 2 3 4 5 …..…..	Production, processing, and marketing of agricultural products is best done at national and international levels.
V. The successful farmer is one who earns enough from farming to enjoy an above average standard of living..	……... 1 2 3 4 5 …..…..	The successful farmer is one who truly enjoys farming even if it provides only a below average standard of living.
W. Technology should be used to make farm labor more rewarding and enjoyable, but not to replace it.	……... 1 2 3 4 5 …..…..	Farm labor should be replaced whenever possible by more efficient machines and other technologies.
X. The abundance and relatively low prices of food in the United States are evidence that American agriculture is the most successful in the world.	……... 1 2 3 4 5 …..…..	High energy use, soil erosion, water pollution, etc., are evidence that U.S. agriculture is not nearly as successful as many believe it to be.

Note. From “Measuring adherence to alternative vs. conventional agricultural paradigms: a proposed scale” by C. E. Beus and R. E. Dunlap, 1991, *Rural Sociology, 56*, p. 432 - 460. Reprinted with permission.

APPENDIX F

INSTITUTIONAL REVIEW BOARD APPROVAL

TEXAS A&M UNIVERSITY
DIVISION OF RESEARCH - OFFICE OF RESEARCH COMPLIANCE AND BIOSAFETY

1186 TAMU, General Services Complex
College Station, TX 77843-1186
750 Agronomy Road, #3501

979.458.1467
FAX 979.862.3176
http://researchcompliance.tamu.edu

Human Subjects Protection Program | Institutional Review Board

APPROVAL DATE: 11-May-2012

MEMORANDUM

TO:	MURPHREY, THERESA PESL
FROM:	Office of Research Compliance Institutional Review Board
SUBJECT:	Initial Review

Protocol Number:	2012-0246
Title:	Measuring, Comparing, and Contrasting the Agricultural Paradigmatic Preferences Held by Florida Extension Agents: The The Redevelopment of and Instrument to Determine Individual and Collective Preferences
Review Category:	Exempt from IRB Review

It has been determined that the referenced protocol application meets the criteria for exemption and no further review is required. However, any amendment or modification to the protocol must be reported to the IRB and reviewed before being implemented to ensure the protocol still meets the criteria for exemption.

This determination was based on the following Code of Federal Regulations:
(http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.htm)

45 CFR 46.101(b)(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior, unless: (a) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (b) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Provisions:

Comments:

This electronic document provides notification of the review results by the Institutional Review Board.

TEXAS A&M UNIVERSITY
DIVISION OF RESEARCH - OFFICE OF RESEARCH COMPLIANCE AND BIOSAFETY

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FAX 979.862.3176
http://researchcompliance.tamu.edu

Human Subjects Protection Program | Institutional Review Board

APPROVAL DATE: 12-Jun-2012

MEMORANDUM

TO: MURPHREY, THERESA PESL

FROM: Office of Research Compliance
Institutional Review Board

SUBJECT: Amendment

Protocol Number:	2012-0246
Title:	Measuring, Comparing, and Contrasting the Agricultural Paradigmatic Preferences Held by Florida Extension Agents: The The Redevelopment of and Instrument to Determine Individual and Collective Preferences
Review Category:	Exempt from IRB Review

It has been determined that the referenced protocol application meets the criteria for exemption and no further review is required. However, any amendment or modification to the protocol must be reported to the IRB and reviewed before being implemented to ensure the protocol still meets the criteria for exemption.

This determination was based on the following Code of Federal Regulations:
(http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.htm)

45 CFR 46.101(b)(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior, unless: (a) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (b) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Provisions:

Comments: The random sample will be obtained through the University of Florida Institute of Food and Agricultural Science (IFAS) data base instead of through the district directors.

This electronic document provides notification of the review results by the Institutional Review Board.

TEXAS A&M UNIVERSITY
DIVISION OF RESEARCH - OFFICE OF RESEARCH COMPLIANCE AND BIOSAFETY

1186 TAMU, General Services Complex
College Station, TX 77843-1186
750 Agronomy Road, #3501

979.458.1467
FAX 979.862.3176
http://researchcompliance.tamu.edu

Human Subjects Protection Program | Institutional Review Board

APPROVAL DATE: 12-Jun-2012

MEMORANDUM

TO:	MURPHREY, THERESA PESL
FROM:	Office of Research Compliance Institutional Review Board
SUBJECT:	Amendment

Protocol Number:	2012-0246
Title:	Measuring, Comparing, and Contrasting the Agricultural Paradigmatic Preferences Held by Florida Extension Agents: The The Redevelopment of and Instrument to Determine Individual and Collective Preferences
Review Category:	Exempt from IRB Review

It has been determined that the referenced protocol application meets the criteria for exemption and no further review is required. However, any amendment or modification to the protocol must be reported to the IRB and reviewed before being implemented to ensure the protocol still meets the criteria for exemption.

This determination was based on the following Code of Federal Regulations:
(http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.htm)

45 CFR 46.101(b)(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior, unless: (a) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (b) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Provisions:

Comments:	Added one new survey question: "Would you describe yourself as: 1) A stronge supporter of sustainable agriculture practices; 2) A stronge supporter of conventional agriculture practices; 3) A supporter of both sustainable and conventional practices; 4) None of the above"

This electronic document provides notification of the review results by the Institutional Review Board.

APPENDIX G

INFORMATION SHEET

Measuring, Comparing, and Contrasting the Agricultural Paradigmatic Preferences Held by Florida Extension Agents: The Redevelopment of an Instrument to Determine Individual and Collective Preferences

--- Information Sheet ---

Note: This is the email that will be used to inform individuals about their participation in this study.

You are invited to take part in a research study being conducted by Theresa Murphrey, a faculty member, and Laura Sanagorski, a doctoral student, both from Texas A&M University. The information in this form is provided to help you decide whether or not to take part. If you decide you do not want to participate, there will be no penalty to you, and you will not lose any benefits you normally would have.

Why Is This Study Being Done?
The purpose of this study is to measure Florida Extension Agents' perceptions about agriculture.

Why Am I Being Asked To Be In This Study?
You are being asked to be in this study because you are an Extension agent for the University of Florida.

How Many People Will Be Asked To Be In This Study?
Approximately 400 participants will be invited to participate in this study statewide.

What Are the Alternatives to being in this study?
The alternative to being in the study is not to participate.

What Will I Be Asked To Do In This Study?
You will be asked to complete an electronic survey. Your participation in this study will last up to fifteen minutes, and will include one visit to a website to access the survey.

Are There Any Risks To Me?
The things that you will be doing are no greater than risks than you would come across in everyday life. You do not have to answer anything you do not want to

Are There Any Benefits To Me
There are no direct benefits to you by being in this study. However, you will be entered into a drawing to win one of two $25.00 gift cards.

Will There Be Any Costs To Me?
Aside from your time, there are no costs for taking part in the study.

Will I Be Paid To Be In This Study?
You will not be paid for being in this study.

Will Information From This Study Be Kept Private?
The records of this study will be kept private. No identifiers linking you to this study will be included in any sort of report that might be published. Research records will be stored securely and only Theresa Murphrey and Laura Sanagorski will have access to the records.

Texas A&M University IRB Approval IRB Protocol # 2012-0246	IRB Exempt Authorized by: SC

Information about you will be stored in a password-protected computer file.

Information about you will be kept confidential to the extent permitted or required by law. People who have access to your information include the Principal Investigator and research study personnel. Representatives of regulatory agencies such as the Office of Human Research Protections (OHRP) and entities such as the Texas A&M University Human Subjects Protection Program may access your records to make sure the study is being run correctly and that information is collected properly.

We may be legally obligated to disclose information under the Texas Public Information Act. Information about you and related to this study will be kept confidential to the extent permitted or required by law. The Texas Public Information Act provides a mechanism for the public to request public information in Texas A&M University's possession, which may include information about you and/or information related to this study. If Texas A&M University receives a request for public information relating to this study, the university will seek to withhold information about you and/or this study to the extent such information may be considered confidential by law and to the extent legally permitted and authorized by the Texas Attorney General's Office to do so.

Who may I Contact for More Information?
You may contact the Principal Investigator, Theresa Murphrey, Ph.D., to tell her about a concern or complaint about this research at 979-458-2749 or t-murphrey@tamu.edu. You may also contact Laura Sanagorski, M.S., (co-investigator), at 954-696-1116 or lsanagorski@tamu.edu.

For questions about your rights as a research participant; or if you have questions, complaints, or concerns about the research, you may call the Texas A&M University Human Subjects Protection Program office at (979) 458-4067 or irb@tamu.edu.

What if I Change My Mind About Participating?
This research is voluntary and you have the choice whether or not to be in this research study. You may decide to not begin or to stop participating at any time. If you choose not to be in this study or stop being in the study, there will be no effect on your employment or other status. Any new information discovered about the research will be provided to you. This information could affect your willingness to continue your participation.

By completing the survey you are giving permission for the investigator to use your information for research purposes.

Thank you.

Theresa Murphrey and Laura Sanagorski

Texas A&M University IRB Approval	IRB Exempt
IRB Protocol # 2012-0246	Authorized by: SC

APPENDIX H

ADDITIONAL FINDINGS – EXPLORATORY FACTOR ANALYSIS

Additional Findings – Exploratory Factor Analysis

Exploratory factor analysis of the 24 questions from the updated ACAP scale was conducted on the data from 69 University of Florida Extension faculty members. The analysis yielded a seven factor solution which accounted for approximately 66.18% of the variance. The results of an orthogonal rotation of the solution is displayed in Table 19. Several scale items loaded on more than one factor, indicating that these items cut across several constructs. Communalities for the individuals were consistently high; the majority of communalities were greater than 0.60. Only three levels of communality were below 0.50. This data is presented in Table 20.

Use of Natural Resources (Factor 1) accounted for 27.67% of the variance. Eight variables loaded onto this factor: O, S, B, Q, D, C, L, and W. These variables were clearly related to use of natural resources and natural production methods.

Four factors loaded onto View of Modern Agriculture (Factor 2) and accounted for 9.30% of the variance: N, X, J, and E. Automation of Agriculture (Factor 3) accounted for 7.73% of the variance. Three items loaded onto this construct: G, F, and M.

Three items loaded onto Extension faculty preference for Size and Scale of Production (Factor 4), which accounted for 6.21% of the variance: A, U, and I. Two items loaded onto Agriculture in the Community (Factor 5), which accounted for 5.65% of the variance: K and H. Faculty's View of the Successful Grower (Factor 6) accounted for 4.87% of the variance. Two factors loaded onto Factor 6: V and R. Two items loaded onto Diversity in Agriculture (factor 7) and accounted for 4.76% of the variance: P and T.

Cronbach's alpha values for individual constructs were as follows: Use of Natural Resources: .852; View of Modern Agriculture: .436; Automation of Agriculture: .657; Size and Scale of Production: .652; Agriculture in the Community: .213; View of the Successful Grower: .547; Diversity in Agriculture: .581. These values are reported in Table 19. It is acknowledged that the reliability of some of these constructs is low, and suggested that a solution with fewer factors be selected for future analyses in order to identify more reliable constructs.

There are a number of recommendations for sample size in factor analysis. Two different schools of thought exist. In one camp, researchers have recommended absolute minimum sample sizes, while in another, recommendations are based upon the number of items being investigated. Comrey and Lee (1973) recommended using sample sizes of 500 of more whenever possible, with 100 indicating a poor sample and 1000 indicating an excellent sample size. A sample size of at least 50 has been offered as a realistic absolute minimum (Winter,Dodou, & Wieringa, 2009). Osborne and Costello (2005) recommended that larger subject to item ratios, such as 20:1, were desirable, but acknowledged that exploratory factor analysis was error-prone by nature regardless of sample size. Field stated that the "larger of 100 subjects or five times the number of variables being analyzed" (2005, p.1) is the appropriate sample size for this analysis. Researchers have proven accurate, valid results from small sizes well below 50 in social science studies (Winter,Dodou, & Wieringa, 2009). Both MacCallum, Widaman, Zhang, and Hong (2005); and Hogarty, Hines, Kromrey, Ferron and Mumford (2005) argued that there was no absolute minimum size or minimum subject to item ratio. MacCallum et al and Hogarty et al determined that higher item communalities favored the use of smaller sample sizes.

The researcher acknowledges that the sample size achieved (N=69) in this study may be less than optimal for exploratory factor analysis. It is suggested that the relatively high communality of items provides potential validity in the seven factor solution. It is also suggested that the solution offered by this exploratory factor analysis is preliminary, and should be replicated with a larger sample size to determine if this instrument identifies the same constructs within larger populations.

Beus and Dunlap (1990, 1991) identified six factors through their use of the original instrument: Centralization versus Decentralization; Dependence versus Independence; Competition versus Community; Domination of Nature versus Harmony with Nature; Specialization versus Diversity; and Exploitation versus Restraint. Beus and Dunlap's Specialization versus Diversity corresponds with the same two items (P, T) that load on the modernized ACAP scale for Diversity in Agriculture. It should be noted that Beus and Dunlap's six factors were described but never statistically tested.

Table 19
Exploratory Factor Analysis of Modernized ACAP Scale Items

Summarized Scale Item	**Component**						
	1	2	3	4	5	6	7
	Use of Natural Resources	View of Modern Agriculture[a]	Automation of Agriculture	Size and scale of production	Agriculture in the community[a]	View of the successful grower	Diversity in agriculture
O. Landowners should farm as much as they can profitably vs. personally	.743						
S. The key to agricultural success lies in overcoming nature vs. harmonizing with nature	.674		.310	.348			
B. Cropland should be managed for profits vs. long-term capacity	.651						
Q. Soil and water should be used as needed. vs. conserved	.640	.440					
D. The primary goal of profitability vs. long-term condition of land	.617				.436		
C. Dependence on high inputs of energy makes agriculture secure vs. vulnerable	.600		.319				
L. Growers should primarily use synthetic vs. natural fertilizers and methods	.596			.546			
W. Technology should be used to replace vs. enhance agricultural labor	.589			.444			
N. Modern agriculture is a cause of minor vs. major environmental problems		.798					
X. The availability of food is evidence that agriculture is successful vs. environmental consequences are evidence that it is not successful		.636					
J. Farm traditions and culture are outdated vs. essential to modern agriculture		-.609			.374		

Table 19 Continued

Summarized Scale Item	**Component**						
	1	2	3	4	5	6	7
	Use of Natural Resources	View of Modern Agriculture[a]	Automation of Agriculture	Size and scale of production	Agriculture in the community[a]	View of the successful grower	Diversity in agriculture
E. The amount of agricultural land owned should not vs. should be limited	.386	.440					.350
G. Success depends on modern technology vs. experience & local knowledge			.768				
F. Science & policy should develop more technologies vs. recognize production limits			.762				
M. Less vs. more people should participate in food production			.481		.462		-.345
A. Meeting food needs with fewer farmers is positive vs. negative				.731			
U. Production of food should take place at local vs. national levels	.392			.570	.397		
I. Less diverse, larger operations vs. diverse, smaller operations meet agricultural needs best	.389	.442		.513	.329		
K. Farming is a business vs. a way of life					.767		
H. Agricultural success will not vs. will be affected by decline of small communities					.421		-.401
V. The successful grower has an above average standard of living vs. enjoys growing crops						.812	
R. Growers should purchase vs. produce most of their goods and services						.701	
P. Producers should specialize in either vs. both crops or livestock							.827

Table 19 Continued

Summarized Scale Item	**Component**						
	1	2	3	4	5	6	7
	Use of Natural Resources	View of Modern Agriculture[a]	Automation of Agriculture	Size and scale of production	Agriculture in the community[a]	View of the successful grower	Diversity in agriculture
T. Agricultural operations should specialize in few crops vs. variety of crops						.448	.655
Eigenvalue	6.641	2.232	1.856	1.490	1.355	1.168	1.142
Percentage of Total Variance Explained	27.67	9.30	7.73	6.21	5.65	4.87	4.76

Note. Principal component analysis rotated using Varimax with Kaiser normalization. Loadings less than 0.30 have been omitted for clarity.

[a]View of Modern Agriculture and Agriculture in the Community factors were found to have extremely low reliability. The reader should be cautioned in interpreting results as they relate to factor analysis based on the small sample size available and the low reliability on two of the constructs.

Table 20
Item Communalities

A	.666
B	.645
C	.477
D	.660
E	.487
F	.677
G	.747
H	.489
I	.775
J	.633
K	.650
L	.736
M	.665
N	.789
O	.674
P	.702
Q	.677
R	.618
S	.721
T	.731
U	.677
V	.712
W	.623
X	.649

APPENDIX I

ADDITIONAL FINDINGS – COMPARISON WITH PREVIOUS DATA

Additional Findings – Comparison with Previous Data

Although the two studies may not be directly comparable, it was deemed to be important to present a comparison with the data reported by Beus and Dunlap (1991). The mean instrument score generated from the University of Florida is similar, although slightly higher (more sustainable) than the mean score generated from Washington State Faculty. The University of Florida faculty known conventional and alternative paradigmatic groups scored similar to the Washington known groups. This information is presented in Table 21.

Table 21
Sustainability Score Comparison with Known Florida Groups and Groups from Beus and Dunlap (1992)

Group	Mean Sustainability Score / ACAP Score	N	Standard Deviation
University of Florida Extension Faculty (2012)	80.64	69	12.74
Florida Sustainable / Alternative Known Group (2012)	93.38	16	19.31
Florida Conventional Known Group (2012)	67.25	12	12.35
Washington State Faculty (1992)	77.3	482	12.7
Washington Alternative Agriculturists (1992)	102.1	317	14.0
Washington Statewide Farmers (1992)	80.9	680	11.6
Washington Conventional Agriculturists (1992)	73.3	231	11.7

APPENDIX J

TABLES REPORTING NONSIGNIFICANT FINDINGS

Table 22
Variance Between Educational Group in Sustainability Score and Individual Construct Score in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel

Measurement	Equality of Variance	
Sustainability Score	F^1	p
	3.777	0.028
Use of Natural Resources	F^1	p
	2.220	.117
View of Modern Agriculture	F^1	p
	.797	.455
Automation of Agriculture	F^1	p
	.350	.706
Size and Scale of Production	F^1	p
	.754	.475
Agriculture in the Community	F^1	p
	.799	.454
View of the Successful Grower	F^1	p
	.610	.547
Diversity in Agriculture	F^1	p
	1.304	.278

Note. [1]Levene's statistic – test of homogeneity of variance.

Table 23
Analysis of Variance Comparing Extension Professionals' Sustainability Score by Educational Level Attained in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel

Univariate Statistics		**N**	**Mean Sustainability Score**	**Standard Deviation**		
	Bachelor's	14	81.36	7.29		
	Master's	45	81.36	12.80		
	Doctorate	9	77.22	18.90		
	Totals	68				
Multivariate Statistics		**df**	**SS**	**MS**	**F_{FB}**	**p**
	Between	2	133.43	66.72	.53	.726
	Within	65	10761.08	165.56		
	Total	67	10894.52			

Note. F_{FB} – Forsythe-Brown F-Test Statistic.

Table 24
Analysis of Variance Comparing Extension Professionals' Use of Natural Resources Component Score by Educational Level Attained in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variance)

Univariate Statistics		**N**	**Mean Use of Natural Resources Score**	**Standard Deviation**		
	Bachelor's	14	3.78	.51		
	Master's	45	3.76	.79		
	Doctorate	9	3.49	.82		
	Totals	68				
Multivariate Statistics		**df**	**SS**	**MS**	**F**	**p**
	Between	2	.59	.29	.53	.593
	Within	65	36.13	.56		
	Total	67	36.71			

Table 25
Analysis of Variance Comparing Extension Professionals' View of Modern Agriculture Component Score by Educational Level Attained in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variance)

Univariate Statistics		**N**		**Standard Deviation**		
	Bachelor's	14	2.56	.60		
	Master's	45	2.78	.59		
	Doctorate	9	2.78	.85		
	Totals	68				
Multivariate Statistics		**df**	**SS**	**MS**	**F**	**p**
	Between	2	.58	.29	.73	.487
	Within	65	26.03	.40		
	Total	67	26.61			

Table 26
Analysis of Variance Comparing Extension Professionals' Automation of Agriculture Component Score by Educational Level Attained in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variance)

Univariate Statistics		**N**	**Mean Automation of Agriculture Score**	**Standard Deviation**		
	Bachelor's	14	3.24	.87		
	Master's	45	3.14	.90		
	Doctorate	9	3.00	.82		
	Totals	68				
Multivariate Statistics		**df**	**SS**	**MS**	**F**	**p**
	Between	2	.31	.16	.20	.820
	Within	65	50.87	.78		
	Total	67	51.18			

Table 27
Analysis of Variance Comparing Extension Professionals' Size and Scale of Production Component Score by Educational Level Attained in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variance)

Univariate Statistics		**N**	**Mean Size and Scale of Production Score**	**Standard Deviation**		
	Bachelor's	14	3.19	.69		
	Master's	45	3.16	.81		
	Doctorate	9	2.96	.96		
	Totals	68				
Multivariate Statistics		**df**	**SS**	**MS**	**F**	**p**
	Between	2	.34	.17	.26	.770
	Within	65	42.17	.65		
	Total	67	42.52			

Table 28
Analysis of Variance Comparing Extension Professionals' Agriculture in the Community Component Score by Educational Level Attained in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variance)

Univariate Statistics		**N**	**Mean Agriculture in the Community Score**	**Standard Deviation**		
	Bachelor's	14	3.36	.63		
	Master's	45	3.71	.72		
	Doctorate	9	3.78	.94		
	Totals	68				
Multivariate Statistics		**df**	**SS**	**MS**	**F**	**p**
	Between	2	1.52	.76	1.41	.252
	Within	65	35.01	.54		
	Total	67	36.53			

Table 29
Analysis of Variance Comparing Extension Professionals' View of the Successful Grower Component Score by Educational Level Attained in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variance)

Univariate Statistics		**N**	**Mean View of the Successful Grower Score**	**Standard Deviation**		
	Bachelor's	14	3.25	.78		
	Master's	45	3.06	.88		
	Doctorate	9	2.67	1.03		
	Totals	68				
Multivariate Statistics		**df**	**SS**	**MS**	**F**	**p**
	Between	2	1.88	.94	1.21	.304
	Within	65	50.49	.78		
	Total	67	52.37			

Table 30
Analysis of Variance Comparing Extension Professionals' Diversity in Agriculture Component Score by Educational Level Attained in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variance)

Univariate Statistics		**N**	**Mean Diversity in Agriculture Score**	**Standard Deviation**		
	Bachelor's	14	3.71	.54		
	Master's	45	3.41	.81		
	Doctorate	9	3.44	.95		
	Totals	68				
Multivariate Statistics		**df**	**SS**	**MS**	**F**	**p**
	Between	2	.99	.50	.80	.453
	Within	65	20.22	.62		
	Total	67	21.22			

Table 31
Variance Between Land-Grant Educated Group in Sustainability Score and Individual Construct Score in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel

Measurement	Equality of Variance	
Sustainability Score	F^1	p
	.798	0.375
Use of Natural Resources	F^1	p
	.101	.752
View of Modern Agriculture	F^1	p
	.004	.950
Automation of Agriculture	F^1	p
	.179	.673
Size and Scale of Production	F^1	p
	3.765	.057
Agriculture in the Community	F^1	p
	.015	.904
View of the Successful Grower	F^1	p
	.295	.585
Diversity in Agriculture	F^1	p
	1.133	.291

Note. [1]Levene’s statistic – test of homogeneity of variance.

Table 32
Independent t-test Comparing Sustainability Score and Component Scores by Land-Grant University Educational Status in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variances)

	Land-Grant Education	**Non-land-grant**	**df**	**t**	**p**
Sustainability Score	80.12	85.78	65	1.235	.221
	(13.15)	(9.74)			
Use of Natural Resources	3.69	4.03	65	1.294	.200
	(.75	(.64)			
View of Modern Agriculture	2.71	2.94	65	1.046	.299
	(.64)	(.61)			
Automation of Agriculture	3.14	3.11	65	0.102	.919
	(.88)	(.94)			
Size and Scale of Production	3.07	3.52	65	1.596	.115
	(.82)	(.47)			
Agriculture in the Community	3.63	3.78	65	.554	.581
	(.75)	(.71)			
View of the Successful Grower	2.97	3.50	65	1.702	.094
	(.89)	(.79)			
Diversity in Agriculture	3.47	3.55	65	.286	.776
	(.81)	(.63)			

Note. Standard Deviations in parentheses below means.

Table 33
Variance Between District on Sustainability Score and Individual Construct Score in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel

Measurement	Equality of Variance	
	F[1]	p
Sustainability Score	1.132	0.350
Use of Natural Resources	F[1]	p
	.791	.536
View of Modern Agriculture	F[1]	p
	.611	.657
Automation of Agriculture	F[1]	p
	1.174	.331
Size and Scale of Production	F[1]	p
	.445	.775
Agriculture in the Community	F[1]	p
	.508	.730
View of the Successful Grower	F[1]	p
	1.985	.108
Diversity in Agriculture	F[1]	p
	2.077	.095

Note. [1]Levene's statistic – test of homogeneity of variance.

Table 34
Analysis of Variance Comparing Extension Professionals' Sustainability Score by District in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variance)

Univariate Statistics		**N**	**Mean Sustainability Score**	**Standard Deviation**		
	Northwest	9	79.67	7.55		
	Northeast	16	80.19	11.48		
	Central	9	79.44	11.25		
	South-Central	10	89.90	20.22		
	South	23	78.57	11.18		
	Totals	67				
Multivariate Statistics		**df**	**SS**	**MS**	**F**	**p**
	Between	4	976.25	244.06	1.53	.204
	Within	62	9871.21	159.21		
	Total	66	10847.46			

Table 35
Analysis of Variance Comparing Extension Professionals' Use of Natural Resources Component Score by District in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variance)

Univariate Statistics		**N**	**Mean Use of Natural Resources Score**	**Standard Deviation**		
	Northwest	9	3.54	.38		
	Northeast	16	3.73	.76		
	Central	9	3.67	.79		
	South-Central	10	4.21	.89		
	South	23	3.58	.72		
	Totals	67				
Multivariate Statistics		**df**	**SS**	**MS**	**F**	**p**
	Between	4	3.22	.80	1.50	.214
	Within	62	33.33	.54		
	Total	66	36.55			

Table 36
Analysis of Variance Comparing Extension Professionals' View of Modern Agriculture Component Score by District in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variance)

Univariate Statistics		**N**	**Mean View of Modern Agriculture Score**	**Standard Deviation**		
	Northwest	9	2.53	.57		
	Northeast	16	2.67	.55		
	Central	9	2.69	.48		
	South-Central	10	3.18	.79		
	South	23	2.71	.66		
	Totals	67				
Multivariate Statistics		**df**	**SS**	**MS**	**F**	**p**
	Between	4	2.42	.60	1.56	.195
	Within	62	23.96	.39		
	Total	66	26.37			

Table 37
Analysis of Variance Comparing Extension Professionals' Automation of Agriculture Component Score by District in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variance)

Univariate Statistics		**N**	**Mean Automation of Agriculture Score**	**Standard Deviation**		
	Northwest	9	3.33	.82		
	Northeast	16	3.08	.91		
	Central	9	2.93	.72		
	South-Central	10	3.33	1.19		
	South	23	3.19	.74		
	Totals	67				
Multivariate Statistics		**df**	**SS**	**MS**	**F**	**p**
	Between	4	1.17	.29	.39	.816
	Within	62	46.69	.75		
	Total	66	47.86			

Table 38
Analysis of Variance Comparing Extension Professionals' Size and Scale of Production Component Score by District in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variance)

Univariate Statistics		**N**	**Mean Size and Scale of Production Score**	**Standard Deviation**		
	Northwest	9	3.22	.71		
	Northeast	16	3.08	.82		
	Central	9	3.30	.61		
	South-Central	10	3.47	1.07		
	South	23	2.99	.76		
	Totals	67				
Multivariate Statistics		**df**	**SS**	**MS**	**F**	**p**
	Between	4	1.94	.48	.75	.561
	Within	62	39.92	.64		
	Total	66	41.85			

Table 39
Analysis of Variance Comparing Extension Professionals' Agriculture in the Community Component Score by District in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variance)

Univariate Statistics		**N**	**Mean Agriculture in the Community Score**	**Standard Deviation**		
	Northwest	9	3.78	.91		
	Northeast	16	3.69	.57		
	Central	9	3.72	.75		
	South-Central	10	3.70	.92		
	South	23	3.57	.71		
	Totals	67				
Multivariate Statistics		**df**	**SS**	**MS**	**F**	**p**
	Between	4	.39	.10	.18	.95
	Within	62	34.80	.57		
	Total	66	35.19			

Table 40
Analysis of Variance Comparing Extension Professionals' View of the Successful Grower Component Score by District in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variance)

Univariate Statistics		**N**	**Mean View of the Successful Grower Score**	**Standard Deviation**		
	Northwest	9	3.06	.39		
	Northeast	16	3.09	1.07		
	Central	9	3.33	.79		
	South-Central	10	3.20	1.09		
	South	23	2.83	.86		
	Totals	67				
Multivariate Statistics		**df**	**SS**	**MS**	**F**	**p**
	Between	4	2.13	.53	.66	.624
	Within	62	50.24	.81		
	Total	66	52.37			

Table 41
Analysis of Variance Comparing Extension Professionals' Diversity in Agriculture Component Score by District in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variance)

Univariate Statistics		**N**	**Mean Diversity in Agriculture Score**	**Standard Deviation**		
	Northwest	9	3.50	.56		
	Northeast	16	3.31	.93		
	Central	9	3.17	.25		
	South-Central	10	4.10	.84		
	South	23	3.41	.78		
	Totals	67				
Multivariate Statistics		**df**	**SS**	**MS**	**F**	**p**
	Between	4	5.28	1.32	2.29	.069
	Within	62	35.66	.58		
	Total	66	40.94			

Table 42

Pearson Correlation Matrix Between Age and Sustainability and Component Scores

	Sustainability Score	Use of Natural Resources	View of Modern Agriculture	Automation of Agriculture	Size and Scale of Production	Agriculture in the Community	View of the Successful Grower	Diversity in Agriculture Score
Age	.188	.168	.07	.09	.148	.199	-.41	.149
p	.151	.199	.595	.487	.259	.127	.758	.256

Table 43
Variance Between Background Group in Sustainability Score and Individual Construct Score in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel

Measurement	Equality of Variance	
Sustainability Score	F^1	p
	.112	0.434
Use of Natural Resources	F^1	p
	.007	.933
View of Modern Agriculture	F^1	p
	.790	.377
Automation of Agriculture	F^1	p
	3.579	.063
Size and Scale of Production	F^1	p
	.976	.327
Agriculture in the Community	F^1	p
	2.869	.095
View of the Successful Grower	F^1	p
	3.995	.050
Diversity in Agriculture	F^1	p
	.694	.408

Note. [1]Levene's statistic – test of homogeneity of variance.

Table 44
Independent t-test Comparing Sustainability Score and Component Scores by Current Agricultural Farm Background Status in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variances)

	Farm Background	**Non-Farm-Background**	**df**	**t**	**p**
Sustainability Score	71.85	81.55	65	.786	.434
	(11.93)	(13.25)			
Use of Natural Resources	3.54	3.79	65	1.256	.214
	(.74)	(.74)			
View of Modern Agriculture	2.53	2.80	65	1.684	.097
	(.53)	(.64)			
Automation of Agriculture	3.37	3.03	65	1.462	.149
	(1.04)	(.79)			
Size and Scale of Production	3.07	3.19	65	.584	.561
	(.85)	(.78)			
Agriculture in the Community	3.50	3.71	65	1.073	.287
	(.63)	(.79)			
View of the Successful Grower	3.18	3.02	58.38	.807	.423
	(.57)	(.97)			
Diversity in Agriculture	3.65	3.42	65	1.078	.285
	(.83)	(.76)			

Note. Standard Deviations in parentheses below means.

Table 45
Variance Between Land Ownership Groups on Sustainability Score and Individual Construct Score in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel

Measurement	**Equality of Variance**	
	F[1]	p
Sustainability Score	1.365	0.247
	F[1]	p
Use of Natural Resources	1.036	.313
	F[1]	p
View of Modern Agriculture	.366	.547
	F[1]	p
Automation of Agriculture	1.252	.267
	F[1]	p
Size and Scale of Production	1.724	.194
	F[1]	p
Agriculture in the Community	.012	.913
	F[1]	p
View of the Successful Grower	.409	.525
	F[1]	p
Diversity in Agriculture	1.029	.314

Note. [1]Levene's statistic – test of homogeneity of variance.

Table 46
Independent t-test Comparing Sustainability Score and Component Scores by Current Agricultural Land Ownership Status in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variances)

	Agricultural Land Owners	**Non-Land-Owners**	**df**	**t**	**p**
Sustainability Score	81.00	80.42	65	.133	.895
	(8.68)	(13.23)			
Use of Natural Resources	3.84	3.68	65	.617	.540
	(.58)	(.76)			
View of Modern Agriculture	2.63	2.76	65	.635	.528
	(.69)	(.63)			
Automation of Agriculture	3.10	3.12	65	.058	.954
	(.69)	(.63)			
Size and Scale of Production	3.30	3.09	65	.761	.450
	(.64)	(.81)			
Agriculture in the Community	3.60	3.67	65	.261	.795
	(.70)	(.75)			
View of the Successful Grower	3.15	3.01	65	.464	.644
	(.67)	(.92)			
Diversity in Agriculture	3.65	3.43	65	.821	.414
	(.63)	(.80)			

Note. Standard Deviations in parentheses below means.

Table 47
Analysis of Variance Comparing Extension Professionals' Sustainability Score by Discipline in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variance)

Univariate Statistics		**N**	**Mean Sustainability Score**	**Standard Deviation**		
	4-H	11	80.55	6.73		
	Agriculture	19	75.26	14.25		
	Horticulture	22	82.73	15.19		
	Family and Consumer Sciences	11	84.91	8.44		
	Other	5	85.00	8.43		
	Totals	68				
Multivariate Statistics		**df**	**SS**	**MS**	**F**	**p**
	Between	4	938.83	234.71	1.49	.217
	Within	63	9955.68	158.03		
	Total	67	10894.52			

Table 48
Analysis of Variance Comparing Extension Professionals' View of Modern Agriculture Component Score by Discipline in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variance)

Univariate Statistics		**N**	**View of Modern Agriculture Score**	**Standard Deviation**		
	4-H	11	2.70	.53		
	Agriculture	19	2.50	.68		
	Horticulture	22	2.83	.69		
	Family and Consumer Sciences	11	2.91	.59		
	Other	5	2.90	.22		
	Totals	68				
Multivariate Statistics		**df**	**SS**	**MS**	**F**	**p**
	Between	4	1.73	.43	1.09	.368
	Within	63	24.89	.40		
	Total	67	26.61			

Table 49
Analysis of Variance Comparing Extension Professionals' Automation of Agriculture Component Score by Discipline in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variance)

Univariate Statistics		**N**	**Mean Automation of Agriculture Score**	**Standard Deviation**		
	4-H	11	2.79	.75		
	Agriculture	19	3.11	.95		
	Horticulture	22	3.29	.96		
	Family and Consumer Sciences	11	3.18	.81		
	Other	5	3.33	.62		
	Totals	68				
Multivariate Statistics		**df**	**SS**	**MS**	**F**	**p**
	Between	4	2.07	.52	.67	.619
	Within	63	49.12	.78		
	Total	67	51.18			

Table 50
Analysis of Variance Comparing Extension Professionals' Size and Scale of Production Component Score by Discipline in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variance)

Univariate Statistics		**N**	**Mean Size and Scale of Production Score**	**Standard Deviation**		
	4-H	11	3.12	.75		
	Agriculture	19	2.86	.91		
	Horticulture	22	3.17	.84		
	Family and Consumer Sciences	11	3.48	.58		
	Other	5	3.40	.37		
	Totals	68				
Multivariate Statistics		**df**	**SS**	**MS**	**F**	**p**
	Between	4	3.16	.79	1.26	.294
	Within	63	39.36	.63		
	Total	67	42.52			

Table 51
Analysis of Variance Comparing Extension Professionals' Agriculture in the Community Component Score by Discipline in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel

Univariate Statistics		**N**	**Mean Agriculture in the Community Score**	**Standard Deviation**		
	4-H	11	3.68	.56		
	Agriculture	19	3.63	.76		
	Horticulture	22	3.59	.70		
	Family and Consumer Sciences	11	3.73	1.10		
	Other	5	3.70	.27		
	Totals	68				
Multivariate Statistics		**df**	**SS**	**MS**	**F_{FB}**	**p**
	Between	4	.172	.04	.082	.990
	Within	63	36.36	.58		
	Total	67	36.53			

Note. F_{FB} – Forsythe-Brown F-Test Statistic.

Table 52
Analysis of Variance Comparing Extension Professionals' View of the Successful Grower Component Score by Discipline in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variance)

Univariate Statistics		**N**	**Mean View Successful Grower Score**	**Standard Deviation**		
	4-H	11	3.50	.55		
	Agriculture	19	3.03	.94		
	Horticulture	22	2.95	.91		
	Family and Consumer Sciences	11	2.82	1.12		
	Other	5	3.00	.35		
	Totals	68				
Multivariate Statistics		**df**	**SS**	**MS**	**F**	**p**
	Between	4	3.04	.76	.97	.430
	Within	63	49.33	.78		
	Total	67	52.37			

Table 53
Analysis of Variance Comparing Extension Professionals' Diversity in Agriculture Component Score by Discipline in a Study to Determine Alternative and Conventional Agricultural Paradigms of Florida Extension Personnel (Equal Variance)

Univariate Statistics		**N**	**Mean Diversity in agriculture Score**	**Standard Deviation**		
	4-H	11	3.36	.74		
	Agriculture	19	3.71	.73		
	Horticulture	22	3.45	.74		
	Family and Consumer Sciences	11	3.18	.98		
	Other	5	3.60	.82		
	Totals	68				
Multivariate Statistics		**df**	**SS**	**MS**	**F**	**p**
	Between	4	2.22	.56	.90	.471
	Within	63	38.99	.62		
	Total	67	41.22			